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Three British adventurers drive snowmobiles across Antarctica on a transglobal expedition (p.44)

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December 1982

Smithsonian

Volume 13, Number 9

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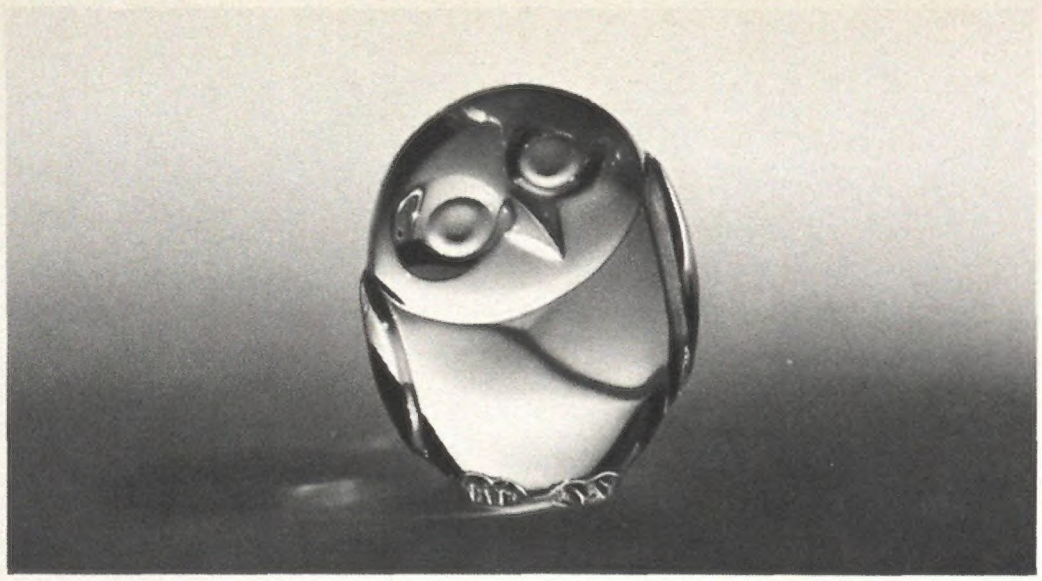

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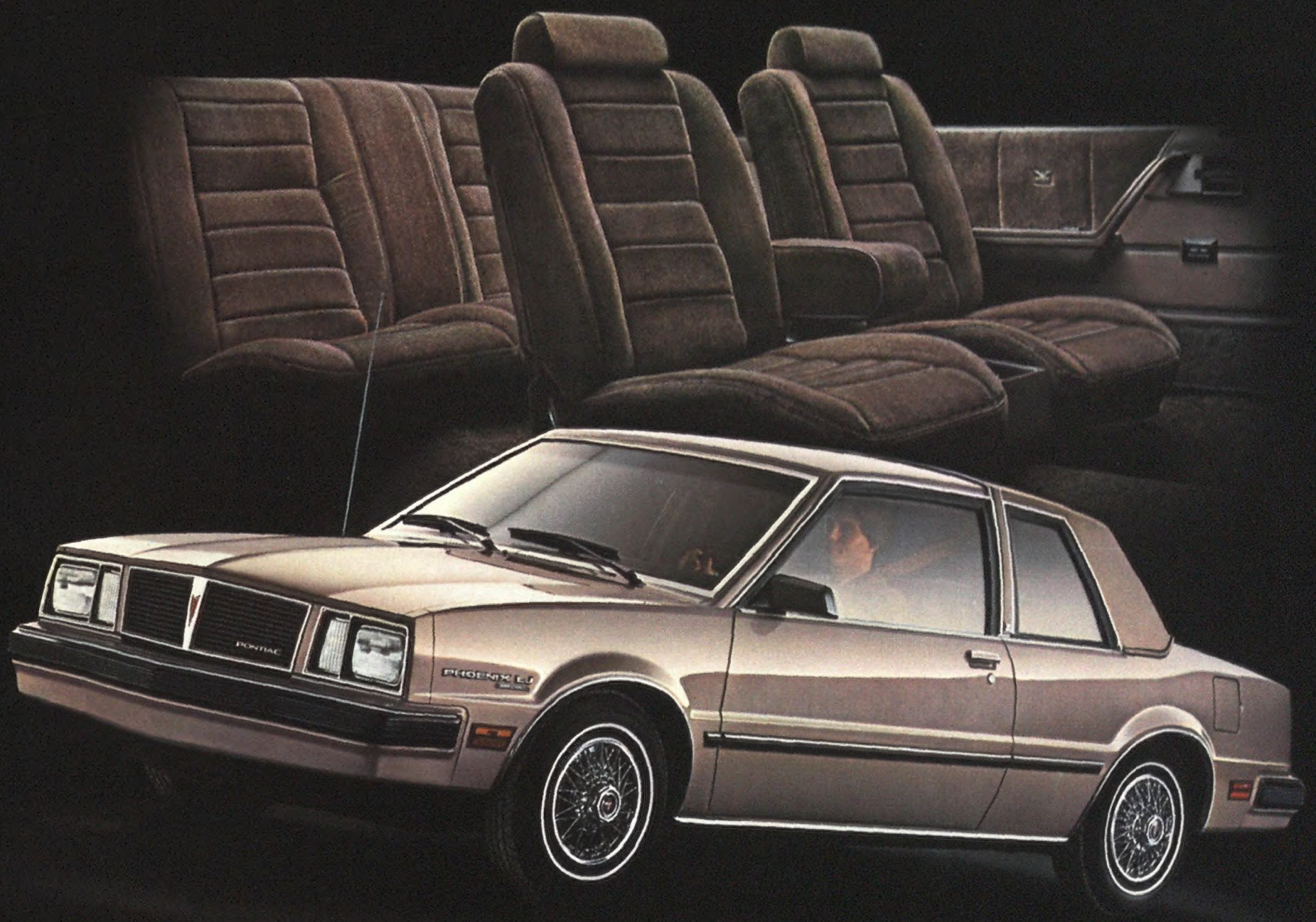

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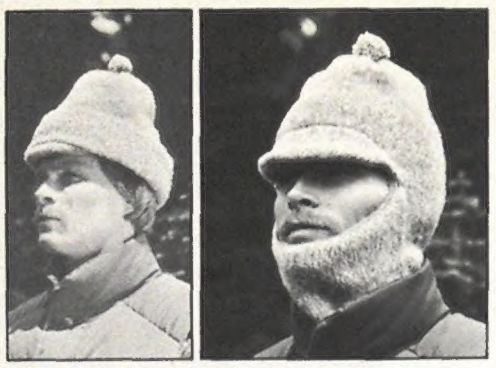

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The view from the castle

Alnwick Castle, home of the Percy family in Northumberland, has a link—through James Smithson—with the castle on the Mall

In early morning the castle keep looks out on the gently meandering River Aln in a small valley below. Flights of black-headed gulls, silent as they molt into their winter plumage, flow back and forth among the newly plowed fields that sweep away to the distant screen of trees. The golden air is as tawny as the fields, reflecting their burnt umber and the rich, yellowish butter-beige of the stones of the outer walls.

This is Alnwick Castle in the north of England, a garrison fort built to keep marauding bands of Scottish border raiders away from the road to York, Durham and Newcastle. The site is important; the history of castles like this begins with the Norman Conquest, though the area has been the scene of battles since Roman days.

From 1309 on, the property has been in the hands of the great Percy family, guardians of the border, created Earls and then Dukes of Northumberland. The family history parallels that of England and Scotland, for Percys have played leading parts in the wars between the English and Scottish kings, the wars of Shakespeare's tales, the Wars of the Roses, the time of Queen Elizabeth, and on to the Stuarts.

Percys have been imprisoned; sometimes killed in battle, like "Harry Hotspur," son of the fourth Lord Percy and first Earl of Northumberland, who was fighting under his father by age 14 and was slain at Shrewsbury in his 30s, in 1403.

Alnwick, still lived in by the family after 673 years, is one of the loveliest existing fortified castles. It is the epitome of a storybook place, with its powerful barbican towers, its drawbridge and the vast outer and middle bailey surrounding its keep. Life-size stone figures of warriors manning the towers and battlements are said to have made the castle appear fully staffed to raiding Scots who lurked in the forest across the Aln.

Inside the keep, the windows are of the "Gothick" style employed by Robert Adam, who was commissioned by the first Duke to re-create the castle as an elegant country house.

Staying in Alnwick with the delightful present-day Percys reminds me of the link between their castle and *our* castle on the Mall, dedicated to James Smithson. The first Duke (1766-86), Sir Hugh Smithson, took the surname of Percy on his marriage to the Percy heiress. Now, after more than 200 years, one wonders if his Smithson son, half-brother of the Percy son who became the second Duke of Northumberland, did not see and stay in this wonderful family seat.

In 1784 young James Smithson traveled north under the guidance of the noted French scientist Barthélémy Faujas de Saint-Fond, a friend of the then-old Benjamin Franklin. Along on the trip was young William Thornton, the American who was to become architect of our Capitol. Thornton met Franklin in Paris that year; perhaps Smithson did too, under the aegis of Faujas. Who knows what thoughts were generated in the young man's head that summer? Perhaps, by some coincidence, there is indeed a relationship of ideas, as well as lineage, between that wonderful Northumberland castle and our own beloved Gothick fantasy on the Mall.

S. Dillon Ripley

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Letters to the Editor

Royal armor

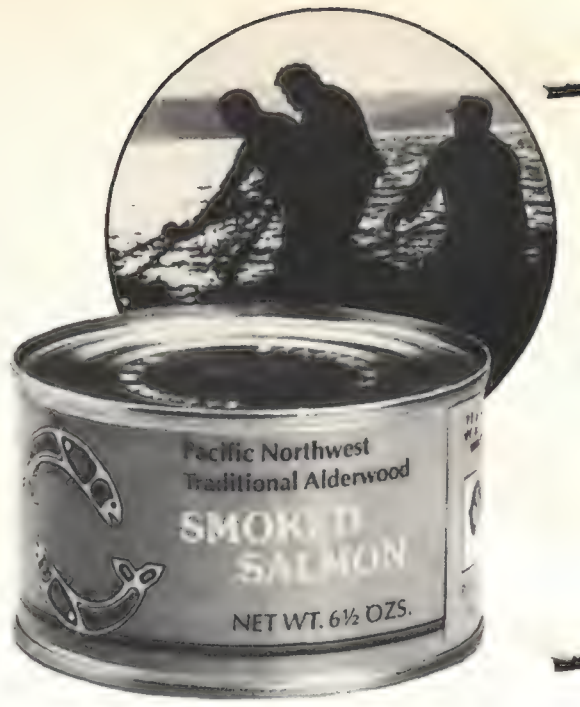
Dear Sir: Referring to your October issue, although I have admired Dr. Bashford Dean's expertise and zeal since my youth, I would like to point out that neither he nor his colleagues at the Metropolitan Museum actually produced a helmet adopted by the U.S. Army.

American troops wore the British-style trench helmet invented by John Leopold Brodie of London from 1917 until the Battle of Midway in 1942. Our indigenous, two-piece M-1 combat helmet, which is being worn by the Marines in Lebanon today, was designed and patented by Infantry Capt. Harold G. Sydenham, assisted by his wife Zelma, in the kitchen of their quarters at Fort Benning, Georgia. Developed at the Infantry's Test Section at that base, it became the M-1 in June 1941, the famous "steel pot" which is only now being replaced by various other steel helmets.

The Sydenhams' papier-mâché prototype is on display in the National Infantry Museum at Fort Benning.

Robert C. Southee
Annandale, Virginia

Dear Sir: Several years ago in the White Tower in London, I spent some time admiring the magnificent display of armor collected by Henry VIII. I noticed that the jousting armor had a clip which looks like half a pin-type hinge attached to the right breastplate for securing a lance-rest, similar to the clip on the armor shown on page 72 of your article. My conclusion was that the lance was held parallel to the body of the horse, and the opponents would pass each other on the right with



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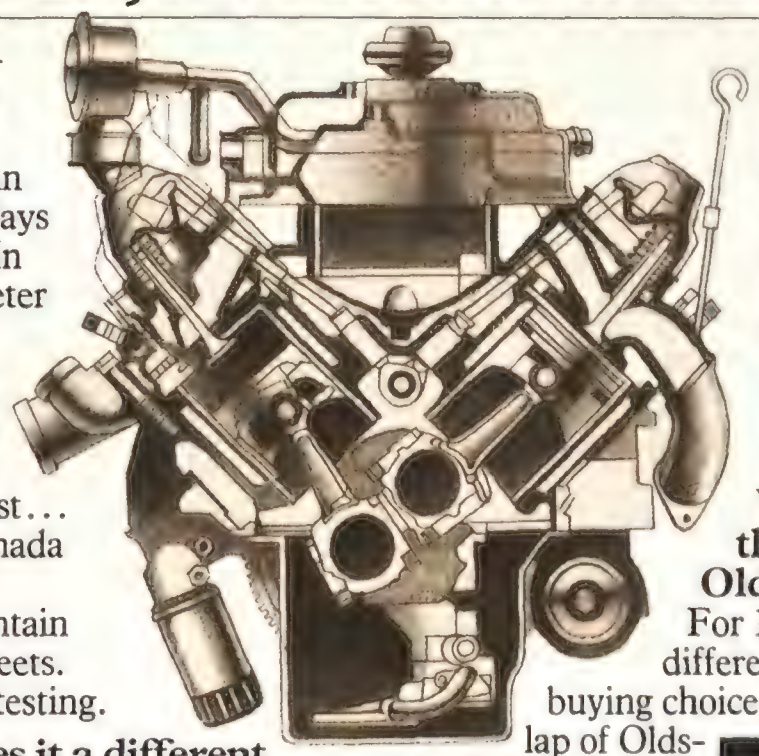

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Available V6 Diesel	EPA Est. Mpg	Est. Hwy.	Est. Range	Est.* Hwy. Range
Cutlass Ciera	28	43	459	705

Easy for a mid-size car like Cutlass Ciera, you say. Well, look at the figures for a full-size Ninety-Eight Regency with diesel V8.

Available V8 Diesel	EPA Est. Mpg	Est. Hwy.	Est. Range	Est.* Hwy. Range
Ninety-Eight Regency	22	38	594	1026

Maintaining a diesel-equipped Olds. It's easy. No spark plugs. No carburetor. No distributor. Simply change oil and oil filter every 5,000 miles and check crankcase ventilation every 15,000 miles. Other than that, it's like servicing any other new Olds. As for filling the fuel tank, diesel fuel is readily available across the country.

V6 or V8, between them, there's a diesel powered Oldsmobile to fit your needs. For 1983, Oldsmobile offers you 20 different ways to make a practical buying choice, while stretching out in the lap of Oldsmobile luxury.

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More good news: New lower prices for 1983! You'll find new lower diesel engine prices across the board. Two hundred and seventy-five dollars less for the V6...one hundred twenty-five dollars less for the V8, based on manufacturer's suggested retail prices compared to last year.

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For more information, write: Dept. D, Oldsmobile Division, 920 Townsend, Lansing, Michigan 48921.

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lances more or less parallel. However, on page 70 is the statement "Two armed riders race toward each other on opposite sides of a barrier, passing left side to left side." What is the explanation?

Edward Harford
Wilmington, Delaware

From the early Middle Ages, a tournament participant's only rigid defense was his shield, held in the left hand, with right hand free for his lance. Jousters presented their left sides to one another and passed left to left, with lances cupped under their right armpits and directed across the horses' necks. Ed.

Chipmunks

Dear Sir: Lawrence Wishner's fine article failed to tell how the chipmunk got his stripes, a mystery variously explained in Indian legends. The one I liked best, as a child, was a Seneca version telling of the first chipmunk, then unstriped, who was foolish enough to make friends with a bear. When the two fell out, the chipmunk escaped into a tunnel which, unfortunately, was just an inch or so under the surface. The angry bear took a mighty swipe at the tunnel and his claws broke through the earth and raked the chipmunk's back. The little fellow got away. But from that day to this, chipmunks have had stripes.

Atwater James
Pittsburgh

Dear Sir: I have noted the presence of chipmunks in my backyard for several years, probably visitors from my neighbor's woodpile. In September, while cleaning a drain from a downspout, I surprised one and he jumped into the drain. I left the drain open for a few days to be sure that he would escape, and then, seeing no signs of him, closed it up. Two days later, there was a 1½" hole in the 3/16" plastic corrugated pipe. Apparently my chipmunk had decided I'd prepared a nice home for him, discovered his mistake and escaped. I've seen him scampering over my lawn, so I presume all is well.

George F. Kosco
Harrisburg, Pennsylvania

Glass flowers

Dear Sir: The arrival of SMITHSONIAN is always an event, but this issue is espe-

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cially so to me because of your delightful article and beautiful pictures of the glass flowers in the Harvard museum.

When I was 15 years old, in 1904, I was privileged to visit the Louisiana Purchase Exposition in St. Louis. There I saw the glass flowers—they were so perfect and so lovely that they have stayed fresh in my memory, giving me great pleasure all these years.

Catharine Hazel Rice
San Jose

Daufuskie Island

Dear Sir: One Monday morning last June, Deacon Johnny Hamilton, whose prayer in pure Gullah during services in Union Baptist Church was mentioned in Alex Haley's article, came into the post office where I am postmistress. I asked whether he had met Mr. Haley. "Yesun," was his answer, "he so easy and quiet, luk lak he couldn't brak uh egg." Those of your readers who are unacquainted with Gullah might need an interpretation: Johnny's message was that Mr. Haley is a nice, easygoing person—a quality he liked in a man he liked.

Mrs. Billie Burn
Daufuskie Island, South Carolina

Dear Sir: I understand that the efforts of the Daufuskie Islanders to insure a good education for their young people extend to those youngsters themselves; that some elementary-school children publish a newsletter and sell subscriptions to augment a scholarship fund. Can you tell me how I can subscribe?

Greg Sweeney
Washington, D.C.

Daufuskie Kids' Magazine *can be ordered by sending $2.70 c/o Mary Fields Elementary School, Daufuskie Island, South Carolina 29915.* Ed.

Bird migration

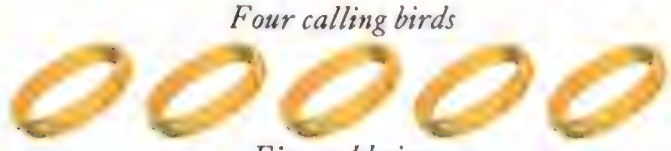
Dear Sir: As an avid bird lover I find the article on migration very disturbing in its account of the disappearance of the habitat so necessary for bird survival. If we lose our birds we also lose the healthiest form of insect control, so much more sensible than all the insecticides which poison our water and food supply. When will people wake up and realize that not only these beautiful birds but also plants and animals are here for a purpose? If we

A partridge in a pear tree

Two turtledoves

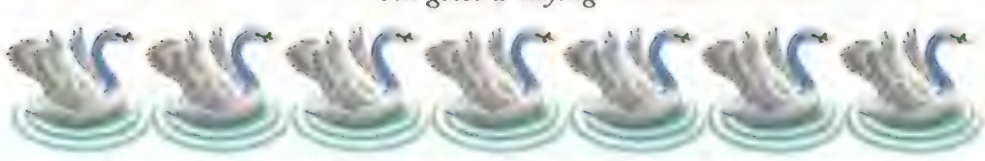
Three French hens

Four calling birds



Five gold rings

Six geese a-laying



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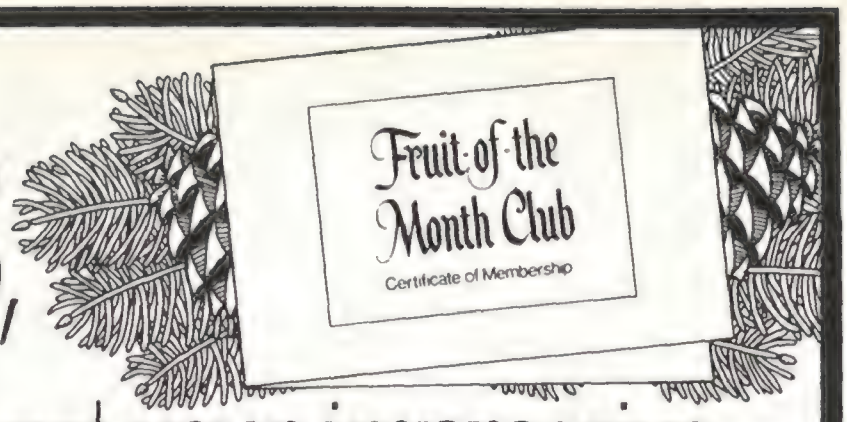

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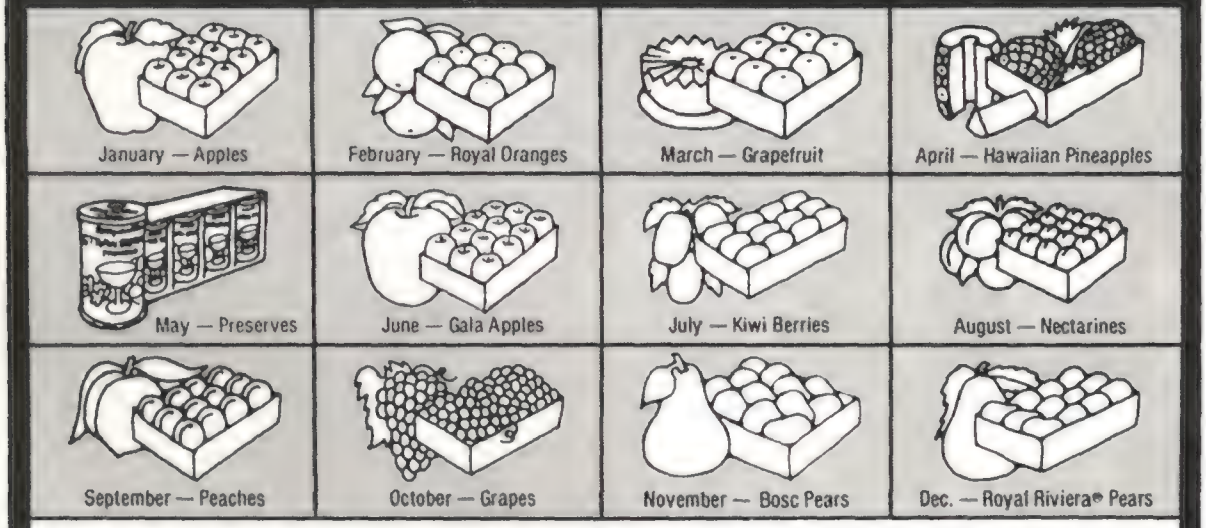

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destroy them we destroy ourselves as well.
Bonnie Beckett
Ashland, Missouri

Dear Sir: Birds' astuteness in selecting rewarding areas can be further demonstrated by the following incident, to which I was witness:

For the past three years I have been privileged to be a volunteer at the Santa Barbara Zoological Park. Among the inhabitants is Groucho, a large gray red-tailed African parrot. During a routine cleaning session, the door of his cage was left slightly ajar. Without a moment's notice, he took off. We sought him through newspaper advertisements and media announcements for several weeks, to no avail. Then, when we had all but given up, an anonymous caller tipped us as to his whereabouts. It seems he had flown directly to a restaurant along the seashore, one of the most lavish dining places in Santa Barbara. He was adopted by the chef, who eventually had taken him home, provided him with a luxurious cage and fed him with tender, loving care. After a bit of persuasion he was returned to the zoo, where his foster parent visits him on his free days. The man was compensated for his expenditures, but he remains unreconciled to losing his pet. As for Groucho, I feed him raw peanuts whenever I can—peanuts are now too expensive to be included in his regular diet.
Florence M. Brandt
Santa Barbara

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Around the Mall and beyond

I pressed my feet firmly on the aluminum pedals as Tina had told me. Just under them the grass began to move faster, and the snarl of the little engine rose in pitch. Then, abruptly, the grass dropped away. There were my old, scuffed boat shoes, protruding in front of me, and beyond them nothing but cool air and, 100 feet below, the fields of Maryland in rich, autumnal colors.

Nine years ago, in our October 1973 issue, SMITHSONIAN ran an article about a daring young man who leapt off cliffs in a winged contraption that became known as a hang glider. It seemed like a harebrained stunt which would have no effect on aviation. Two years ago, in its November 1980 issue, SMITHSONIAN described how certain other fliers were adding little two-cycle engines to hang gliders, with tiny propellers to keep them flying. They seemed sort of good fun if a person was crazy enough to try one. But they also seemed limited to the Experimental Aircraft Association's Fly-In at Oshkosh, Wisconsin, or to California, where, God knows, anything can happen. We told ourselves we'd never see one of those babies around staid old Washington, D.C. Not on your life. Even though, as a sometime pilot, I was pleasantly itched by the concept of these ultralights, I knew I would never fly one.

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I also learned what it's like to sit out in the open above the countryside; to feel the plane battle against the wind, making very little ground speed, and then to float with it like an autumn leaf; to want to stay aloft a long time, just fooling around in the air, except that the breeze blowing up your pants' legs gradually makes you want a cup of hot coffee even more. I actually shot a landing, with considerable help from Tina.

"Tina must have let you fly," said Lyle Byrum when we taxied up to the coffee. "You got a grin a mile wide."

Lyle is president of an ultralight company in California (where else?) called Eipper Aircraft, Inc. It's the largest of a great many firms now manufacturing these little aircraft. Byrum, a quiet young man and a superb acrobatic pilot, has brought out a single-seater with a 20-horsepower snowmobile engine, another with 30 horsepower, and now, as I can attest, a two-seater that allows recruits like me to sit beside and learn from an instructor instead of climbing into a single-seater and fooling around until it comes to you.

The advent of the two-seater exemplifies what's happening in ultralights. Scary little home-built planes are giving way to organized production, often of

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well-thought-out kits that cost less than a small car. Byrum, who is also president of the Powered Ultralight Manufacturers Association (see? now they have an association), points out that in 1975 there were only a handful of powered ultralights in the world. Now there are some 20,000, and that number will soon double. So of course the authorities are taking notice and finally coming up with regulations. Already the Air Safety Foundation, which is linked with the huge Aircraft Owners and Pilots Association (AOPA), is developing a self-regulating program that will set up requirements for would-be ultralight pilots.

I realized, as I left that little field, the smile still frozen on my face, that I had been experiencing an encapsulated history of flight. Just as the hang-glider fliers had reincarnated the skills of Otto Lilienthal, who flew much the same device in the 1890s, so the ultralight designers and pilots with their simple flying machines are reliving the days of the Wrights and Glenn Curtiss. Sure, they use tubular aluminum and light, strong synthetic fabric instead of wood and sewn cotton, but the result is the same—the delight of primitive flight.

And now come the next steps in this déjà vu of aviation. We already see reconstructed military planes with rondels and Maltese crosses, in which pilots sit in open cockpits and wear goggles and silk scarves. And what comes next in this second cycle? Will someone fly the Atlantic?

One aspect of the repetition bids fair to continue: regulations will expand to cover each new/old phase. I drove away with the sudden realization that I had caught the carousel at a magical moment. In a spanking new design, and as yet unhampered by the bleak presence of authority, I had gone through 30 minutes of that thing we so often forget. Fun.

The National Air and Space Museum has an ultralight similar to the ones with which I was associated. At time of writing, it's off somewhere on loan. The best the museum on the Mall can do to capture the feeling of flight is to keep showing its wonderful films. *To Fly* is still going strong. So is *Living Planet*. And now the new offering, *Flyers*, is on the schedule and packing them in. *Flyers* tells a distinct story of a restorer-stunt pilot, Kyle Murphy, trying to teach his gung ho young friend to get into the act without

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killing himself. It includes a spectacular stunt over the Grand Canyon, which I deemed simply impossible. But my colleague Connie Bond, in "Highlights" (pp. 160-61), makes it clear that it *was* done, and describes how.

The museum's 70-mm IMAX projection system comes from Canada, and so did the 50-foot space arm that the shuttle *Columbia* tried out on its second flight, in November 1981. This Remote Manipulator System has six joints, rather like a human arm—two at the "shoulder," one at the "elbow" and a complex arrangement of three at the "wrist." It can reach into the cargo bay of the shuttle, pluck out a small satellite, and gently put it in orbit without imparting a spin to it.

The Canadians used their IMAX process to record one of the flights of *Columbia* and put the show, *Hail Columbia!*, on at the Air and Space Museum last September. Here was IMAX used at its mighty best. I'd never been to a space shot, but I fully agreed with a remark I overheard at the reception after the show —which was put on for us courtesy of the Canadian Ambassador. People were still agog at the thundering blast-off, filling that huge screen with bright fury and pounding it into our ears from six of the speakers in the Samuel P. Langley Theater. And someone said to a friend, "Have you ever seen the real thing?" And the friend replied, "Now I have."

On top of these two films, I was asked to attend a screening of *Gandhi*, the three-hour-plus biographical blockbuster that is opening right now in New Delhi and other parts of the world. The Motion Picture Association in Washington arranged the screening for interested people, and I suppose because of a mix-up in names, I was admitted. At a screening you sit in a very wide and comfortable chair, and either at the end of the show or the intermission you go out to the lobby where there are various things to sip and munch. The refreshment break came during the intermission of *Gandhi*, since it's a long show, and the viewers were eerily quiet. Not a word. The reason, of course, as will be clear to those who see the film, is that this movie is a very powerful statement about idealism and racism and inspiration and politics, all based on the life of that strange, stubborn, awesome guru—half mystic, half "pol," a blend of unbelievable physical

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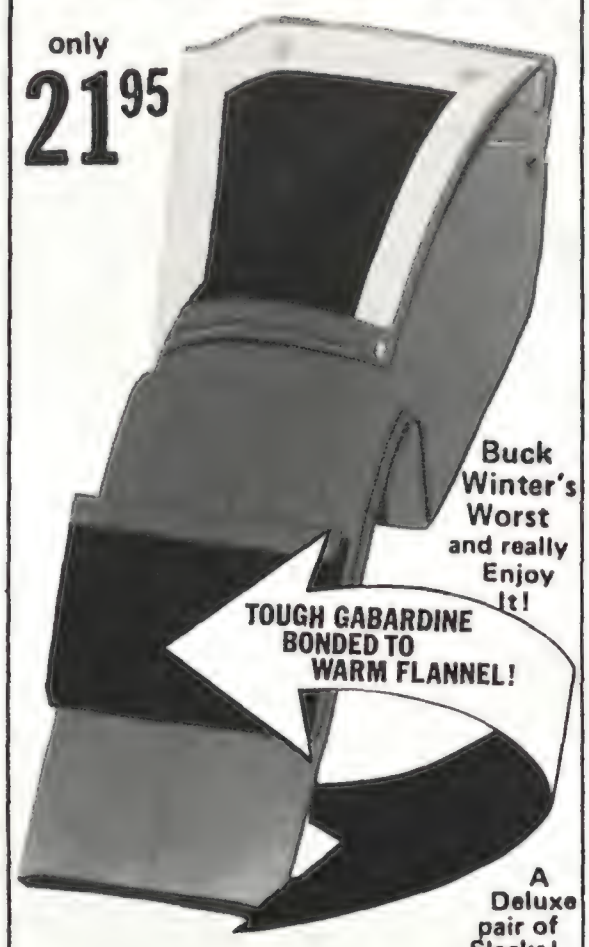

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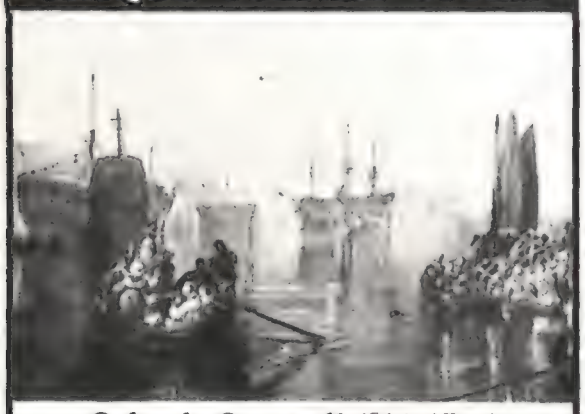

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and moral courage, serenity, complete self-assurance, innocence that seemed almost silly sometimes, and the cleverness of Machiavelli.

Gandhi was directed by Sir Richard Attenborough, brother of David Attenborough, who put together the television series *Life on Earth* (SMITHSONIAN, November 1981). Sir Richard had been an actor and producer, but had never felt the urge to direct until he "discovered" Gandhi's life story.

Two of us got to talk to Sir Richard and found him a warm and entertaining man; not very tall, not overwhelming except in his enthusiasms. He talks with a lot of body language, acting out things.

He said he got wrapped up in the Gandhi possibilities after having been persuaded to read Louis Fischer's biography, *The Life of Mahatma Gandhi*. Attenborough noted, early in the book, a quotation from Gandhi's own autobiography: "It has always been a mystery to me how men can feel themselves honored by the humiliation of their fellow-beings." That sentence sort of did it for Attenborough. He lived for the next 20 years with the idea of doing his film on the Indian leader.

He told us some things about filming the scenes in India. For Gandhi's funeral scene, some 85,000 villagers were trucked into Delhi as extras and were joined by a couple of hundred thousand more; many simply relived the funeral that they had seen in actuality in 1948. Ben Kingsley, the actor who plays the Mahatma, is part Indian, his father's family having come from the same state in which Gandhi was born. When he appeared, costumed and made-up to play the part, villagers would reach out to touch his clothing, even his feet, in deepest respect. Attenborough says they knew he was an actor, but they felt Gandhi lived again for a moment.

And during the filming of the terrible, shattering massacre scene at Amritsar, real Gurkha and Baluchi troops were used to fire into the crowd as they did in 1919. But, this being a movie, they had to repeat the "slaughter" again and again. And, says Sir Richard, it got to be too much for a couple of proud old Sikhs in the crowd. Suddenly, instead of falling dead as they were supposed to, these two old tigers drew their curved swords and charged the Gurkhas!

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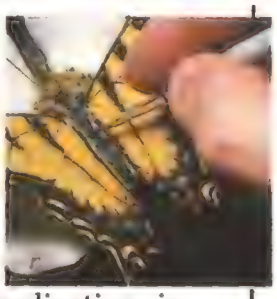

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Phenomena, comment and notes

For one novice birder overwhelmed by rivers of hawks at Cape May, seeing a heron in the marshes can be a tonic

There I was, at one of the top birding "hot spots" in the country. The right time of year, even the right weather for a "day of madness." It was noon on a sunny Friday in late September when I parked my car in Cape May Point State Park. Everywhere I looked were people with binoculars, spotting scopes on tripods, cameras with two-foot telephoto lenses.

I had read descriptions of songbirds weighing down the bushes, blocking the roads, more species in sight at one time than I would see in my local woods in a month. I walked across the parking lot, past a wooden platform bristling with scopes and cameras, and along a pond into the dunes. A lone egret patrolled the far shore of the pond, a handful of laughing gulls loitered on a flat. Monarch butterflies floated and fluttered everywhere in the rugosa roses and ragweed, but not a bird was visible. Something was wrong.

Back to the platform. These were serious birders and judging by license plates in the lot (Illinois, Quebec), some had come a lot farther than I had. Wearing my binoculars as credentials, I walked up the ramp and eavesdropped.

"Twenty, 30, make that 40 sharpies."

"Did you get that merlin [pigeon hawk]? I don't think the bunker saw it."

"I've got some broadwings over here, but I don't think we should count them. They're not going anywhere."

No one had come for shorebirds or songbirds. They were here for hawks, and

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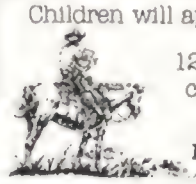

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they were having a day if not of madness, at least of raptor satiety. Most of my bird watching has been more or less horizontal—into the bushes, across marshes. Now I looked straight up—and caught my breath. I saw a hawk, hundreds of feet high, floating in a thermal. And another. And six more. Some were low enough for me to see patterns on their wings, their bodies, their tails. But others, seen through seven-power binoculars, were no more than black specks, points of reference to give dimension to the formless blue of the sky, so high they gave me vertigo as I stood on solid footing.

In one direction, etched against the white of a towering cumulus cloud, at least 40 birds were floating, circling, sometimes chasing each other in short spurts. A kettle of hawks.

To my inexperienced and by now unnerved eye, the hawks did not seem to be migrating at all. They were in no hurry, no singleminded commuters trying to "make time" on their yearly voyage. Sailing, swooping, drifting, they seemed free spirits milling around. But gradually the groups would drift west, toward Delaware Bay and the flight across 15 miles of water before they turned south again.

Harry LeGrand, an ornithologist with a doctorate from Clemson, was the official counter, working from one corner of the platform. (Other counters used an old ammunition bunker now awash in the surf, or took up positions by the lighthouse.) LeGrand used clickers for sharp-shinned hawks (1,200 by noon) and American kestrels, and a pencil for species coming by in more manageable numbers.

The total for all species came to 2,681 hawks that Friday, unimagined riches to me, but fewer than the 3,412 seen the previous Friday and nowhere near the 21,800 recorded on October 4, 1977.

They were also seeing bald eagles, immature birds that testified to increased breeding success. I had almost gone into cardiac arrest when I saw my first bald eagle, improbably large and somehow dusty looking, sitting serenely in a tree in Blackwater National Wildlife Refuge last summer. I knew they were recovering (SMITHSONIAN, May 1982) but had not really expected to see one. On the hawk platform, when a woman rushed up to say she had seen one at Lily Lake earlier in the day, the hawk watchers said that

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yes, it had come by about a half-hour ago. They almost yawned.

When a peregrine rocketed by, however, nobody tried to be blasé. Shouting, pointing: "Did you get him?"

The watchers had seen no fewer than 11 peregrines the day before, and would see 21 on Sunday. The scuttlebutt on the platform was that the peregrines were coming from Canada and even Greenland, although no one knew.

LeGrand was in touch by walkie-talkie with hawk-banding stations a couple of hundred yards east of the platform.

"South Station calling East Station: Have the bleeders left yet? It's raining hawks here." (The bleeders were a separate team taking blood samples.)

"Don't know where they are. Let the birds go. We played with a merlin 20 minutes but he would not take it [a band]. Never saw anything like it. Fifteen in the last half hour."

The next day I watched the hawk banders from a path through an overgrown field. Tethered lure birds (all introduced species like starlings and ringed turtle doves) hopped about in a complicated rig of poles, trip wires and fine nets. Shoulder to shoulder with birders who now filled every trail in the park, we waited. I wondered what it must do to a hawk to swoop down on its prey, only to be trapped in a net, handled, stuck with a needle. Would it hesitate the next time? Intellectually I understood that it is not enough to identify and count birds. You sometimes have to catch them. How else to find out where the peregrines are really coming from? But in that field, waiting for a hawk to be fooled, I still felt uneasy.

When a person starts to play a video game, the blood pressure can nearly double within a few seconds. Mine seemed to double a lot faster than that when a hawk came hurtling across a cultivated field, not five feet off the ground, only to bulge out a net and then, by its weight, form a tube of netting almost to the ground, swinging like crumpled trash in the toe of a woman's stocking. Two, three, four more hawks dropped out of the sky, flying into more nets; two more were trapped. In the excitement, my doubts disappeared.

A man down the line began to shout "Peregrine! Peregrine!" And there it was, mostly in silhouette, but a bird apart. Its wings seemed to flex more than other birds', and it gave the uncanny sensation of accelerating all the time, like a very good skater breaking away down the ice in a hockey game. One definition of jazz is that the tempo seems faster than it actually is, a feeling that adds to the excitement. And thus it was with this peregrine, skimming the treetops, making other birds seem clumsy. Even allowing for buck fever, for the contagious excite-

With the lighthouse at their backs, birders watch the hawks soaring over Cape May Point State Park in New Jersey.

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ment in the crowd of people, it seemed a bird apart, not just faster but somehow more intense. I had not only seen a peregrine, I had somehow *felt* a peregrine. Great efforts are under way to reintroduce them in the East (SMITHSONIAN, September 1980); they should be an easy ten points added to anybody's Quality of Life Index.

Birds migrating south have been hitting the coastline and following it south to Cape May for a long time, long before it became a Victorian resort (SMITHSONIAN, September 1978), before the Dutch sailor Captain Cornelius Mey dropped anchor. They still come through, despite the buildings and noise and highways and lights. (Just to the north, in Stone Harbor, I walked up to 100 black skimmers resting on a mud flat within yards of a busy highway; only when I came too close did they fly up, one coming straight at me, dropping its oversize lower bill straight down to cry raucously at me. Birds not only migrate through the human bustle, they live in it. Inside the Stone Harbor Bird Sanctuary—just 21 acres bounded by busy streets and surrounded by houses—herons, egrets and ibis raise young in a marsh they have probably been using since long before the first developer arrived.)

But continual human encroachment does cause problems for the migrating birds. Peter Dunne, director of the Cape May Bird Observatory, is a political scientist by training who by his own efforts became what he calls a "field researcher" and was the first hawk counter in 1976. His office is in a house that looks out on Lily Lake in front and a "three-lot" sanctuary in back. A large square window looks out into a tangled mass of shrubs and trees on the side of the house, and Dunne would interrupt his own thoughts to call out "black and white warbler" or "redstart." He is most excited about saving a place for the birds. Conservationists, Dunne says, have often concentrated on preserving breeding grounds and wintering grounds, but not much in between. Yet when bad weather forces the birds to pile up at Cape May, they need someplace to put down. He feels one of the most important things he and the Observatory have done has been to help secure more than 400 acres at Higbee Beach on the west side of the Cape for New Jersey's Division of Fish, Game & Wildlife, and

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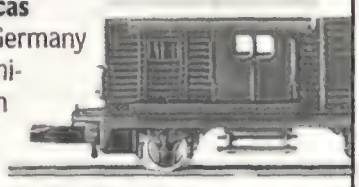

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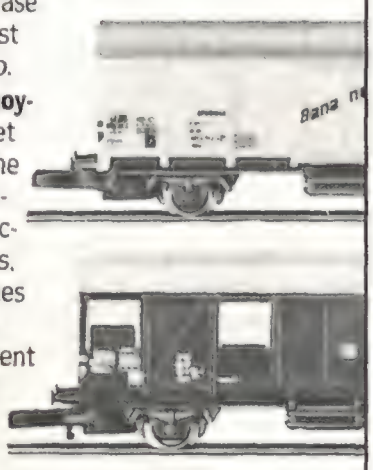

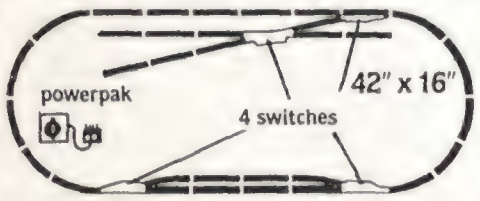

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the 180 acres at South Cape May Meadows, just east of the park, for the Nature Conservancy.

Three days of birding at Cape May was a little overwhelming; 2,000 to 3,000 hawks a day far exceeds my capacity to appreciate them. My fondest memory is of sitting out on the end of a little dock in the marshes, leaning back against a piling to make notes and occasionally to pick up the binoculars for one more look at the hawks against the clouds. A bird I took to be an immature green-backed heron came out of the reeds and plopped down into the water, splashing vigorously as it bathed. Then it walked up on top of a muskrat dome and shook itself dry, snapping its crest erect as it waved its wings about. It walked back down into the water (why don't herons' feet rot?), stepping slowly, searching for prey with bright golden eyes. A stab, and up with a wriggling snake. But the snake was not giving up. The heron would toss its head around, then pin the snake to the ground, trying to get it into a better position for swallowing. Again and again the heron tried to maneuver the snake, then suddenly the snake was gone, wriggled free and away. I would have sworn the heron shrugged. Then it resumed the careful steps, looking for easier game. Finally it flew down a channel between the reeds and out of sight.

I admire the hawks; I salute them. I am glad that some 90,000 of them are alive to be counted as they fly over Cape May in the fall, that many tens of thousands more fly by uncounted, that whole other rivers of hawks flow over the mountains of Pennsylvania and elsewhere. I hope more people save more space for them. But I can't get close to them. They soar, and I can only plod.

Marston Bates said in *The Forest and the Sea* that he prefers fish watching to bird watching because he can "float or dive or pause suspended" in the midst of the fish but has no way of being a bird. The heron somehow seemed to fall between. I will never soar with the hawks. But in the marsh the heron and I share wet feet and see eye to eye, bright gold to dull gray. The heron, too, was there before offices and stores, electric lights and automobiles, and the heron is there as I type, and I can go back and see him and try to understand the real world.

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By Bryn Campbell

'A suitably mad and

British adventure'

Under Royal patronage of Prince Charles, an intrepid British team spends three years circumnavigating the globe over both Poles

On final stage of 2,400-mile Antarctic crossing, team approaches Scott Base. In background is Mt. Erebus.

It was a long, robust day in a short, fragile summer. The sky was too blue and the snow was too bright. We stared out at a world of huge, shiny surfaces and open space, pure and inhospitable, a landscape seemingly of gloss paint, porcelain and glass. Sir Ranulph Fiennes jumped from the deck rail onto the ice. The Transglobe Expedition had set foot in the Antarctic.

More of us went ashore, stamped around and looked back at our ship. Fussy with masts and derricks, the *Benjamin Bowring* lay like a scribble along the clean line of the ice edge.

Four months earlier, on September 2, 1979, she had set off from London with the Expedition's patron, the Prince of Wales, at the wheel. He described the team's aim—the first-ever circumnavigation of the world by land, sea and ice, via both the South and North Poles—as "a suitably mad and splendidly British idea."

A line around the globe

Sir Ranulph's wife, Virginia (Ran and Ginny they prefer to be called), first thought of the project. After leading three minor expeditions and fighting communist rebels in the Oman, where he was decorated for bravery, Ran needed a new challenge. Ginny suggested following a line of longitude, like the Greenwich Meridian, right around the globe.

The research, planning and preparation would take seven years and the journey itself a further three. The total cost was obviously going to be enormous, but manufacturers were prepared to give or loan equipment and other supplies, and to make up the team there were dozens of volunteers willing to give up their careers. From among them Ran selected two companions: Charles Burton and Oliver Shepard, in their mid-30s like Ran and from a similar background of public school and military service. Ran had joined the Royal Scots Greys and then the legendary SAS, the Special Air Service, and looked set for a fine army career when he ruined everything with a foolish if well-intentioned escapade. The American film *Doctor Dolittle* was being shot at a particularly beautiful English village and apparently the locals were aggrieved at the invasion of their privacy and such changes as the damming of a trout stream and the creation of an artificial lake. Some of the villagers objected strongly to this Yank incursion. Ran was recruited into a scheme to demolish the sandbag dam and draw public attention to what they considered the "high-handed methods of the moguls."

He and his friends created a diversion by setting off a series of plastic explosive flares, and then they moved in to attack the dam itself. The police were waiting for them and the judge took a dim view of their use of explosives. They were fined, and Ran was

Route of expedition from Greenwich appears on this unusual projection which shows both Polar regions.

subsequently removed from the SAS. However, the incident did little to dampen his spirit of adventure.

It seemed important to Ran to lead and to be seen to be leading. Fiercely competitive, he did not take kindly to criticism and yet nobody worked harder than he did and he never shrank from his responsibilities.

Ollie and Charlie were much more relaxed personalities. Ollie was blessed with considerable easy charm and was unfailingly courteous even in the most

Not far from Borga, Charles Burton examines one of crevasses that were a constant hazard in Antarctic.

unpleasant conditions. He fussed over the snowmobiles to be used in the Antarctic crossing, and their reliable performance was largely to his credit.

Charlie was easy-going, rambunctious, good-hearted, and always reliable in a crisis. He was the man you wanted with you when things got tough. If Ran had the will to succeed, Charlie had the will to survive.

The three-man ice group formed the tip of the wedge-shaped operation. Their back-up team included Ginny, in charge of communications; up to three reserves, also responsible for general maintenance and assistance; and two aircrew. I joined the expedition periodically to serve as reporter and photographer. Prince Charles took an enthusiastic interest in the project and gave invaluable help.

Once the Prince left the ship near the mouth of the River Thames, the expedition was finally on its own and on its way. The early part of the journey, through France and Spain, then across to Algiers, was commonplace enough. Even the drive across the western Sahara followed a well-worn tourist route. Traveling around the world was fundamental to the concept of the Transglobe Expedition but it was never seriously expected that the team would meet up with any major problems outside of the polar crossings, in the Northwest Passage and perhaps on the Yukon River. Those added up to more than enough hazards to worry about.

The worries began when we reached our destination in the Antarctic, Sanae Buchte. Now 1,100 drums of fuel and 200 tons of stores had to be sledged for a mile across the bay ice, up a gentle ramp onto the main ice shelf and then a mile deeper inland to a suitable campsite well away from the ice edge.

Eight hours on duty, four hours off, the crew worked day and night. The fuel drums weighed about 450 pounds each and the small two-stroke snowmobiles could haul only two at a time.

Their drivers, swaddled and begoggled like World War I fighter pilots, seemed to have the most glamorous job. Towing a heaped sledge, a driver racketed across the bay, accelerating toward the ramp, rising and rocking in the saddle to coax the machine up the incline. Then he would dump the load and race back.

It was less fun than it looked. The temperature was dropping and the wind was rising, a lethal combination. At speed, the effects of the cold tripled. One's face froze, one's nose leaked and one's arms ached with steering out of the ruts. At Sanae, prefabricated huts

Bryn Campbell, a former picture editor of the London Observer *and editor of the book* World Photography, *spent 12 months traveling with Transglobe Expedition.*

During bad weather on Ross Ice Shelf, Sir Ranulph Fiennes struggles against wind to erect one of tents.

specially built for the expedition were quickly erected. Made of insulated cardboard, they sounded rather insubstantial for the Antarctic, where winter temperatures of —76 degrees F and 100-knot winds are unexceptional, but they proved light to carry, easy to put up and warm to live in.

The huts would also be used at the second camp, to be sited 200 miles away in the mountains of the Borga Massif, where the ice group and Ginny would winter over. The ice group would thus have a head start, with one massive crevasse zone behind them, when they set out for the Pole the following summer. Ninety tons of fuel and stores would be flown there by Transglobe's aircraft, a DeHavilland Twin Otter fitted with skids. It arrived on schedule with Giles Kershaw, the pilot, and Gerry Nicholson, the engineer, both well used to Antarctic flying.

In the next month the aircraft made 80 round trips to the new base, 6,500 feet high in the mountains. Returning from Borga late one night, we flew over the ship, just before she left for Cape Town. The low sun—we were enjoying 24 hours of daylight—was warming one side of the red hull like the glow from an electric toaster, stretching shadows far down the bay and describing the precise interface of sea and ice. I drove back alone from the airstrip, stopped the snowmobile a mile from the ship and switched off the engine. There was sudden quiet, then a real silence, and ultimately a peace that lay heavy in the air.

Ran, Oliver and Charlie set off from Sanae to Borga on their snowmobiles, each towing a heavily laden sledge on 50 feet of rope. In theory, if the machine dropped into a crevasse, the right angle formed in the rope would brake the sledge and so anchor the snowmobile. The safety-harnessed driver could then climb up or be hauled out. They passed over crumbling snowbridges spanning great crevasses without visible bottoms. The worst area was known as the Hinge Zone. A year later a group of 12 scientists in caterpillar vehicles tried the same route. They lost two machines forever and a young scientist fell 90 feet and broke his neck. In 1981 at a British base farther around the coast, two scientists were killed in a crevasse field using snowmobiles like our own. In 1982, three scientists from another British base disappeared along the coastal ice on a short winter journey. Fortunately we had no such emergencies, despite a few unpleasant moments. The journey—about 270 miles allowing for detours—was completed in three-and-a-half days, an encouraging start.

Crevasses were also opening up back at the camp at Sanae. We could hear the bay ice breaking at night, like the sound of a tank battle. A long fissure was spreading from the western cliffs, still very narrow but hundreds of feet deep.

As arranged, a South African supply ship evacuated everybody not wintering over. At Borga, one woman, three men and a dog settled down to face eight months of darkness and cold.

Charlie and Oliver shared one half of a hut, with Ran and Ginny in the other half. Bothie, Ginny's long-haired Jack Russell terrier, made himself comfortable wherever he chose. A lovable pest, his antics helped to ease the strain of their situation.

They all had their individual responsibilities. Ran was in charge of fuel and camp maintenance. He dug a long trench from one of the hut entrances, covered it over and lined it with the supply boxes. It made fetching stores much simpler.

Oliver looked after the generators that provided the electricity, serviced the snowmobiles and made daily meteorological recordings. Charlie did the cooking, helped occasionally by Ginny, and he also gave Oliver a hand with the generators.

Ginny kept in touch with London and their base at Sanae. She had to grope her way foot by foot through the pitch-blackness or through a whiteout to where she had to work, following a safety rope hundreds of yards to the radio shack, often with the temperature below –40 degrees F. In her early 30s, she wished that the journey had taken place ten years before "because my main hope in life is to have a family and I do regret possibly missing out on that."

They all found that they had less spare time than they had expected. "Everything seemed to take so long to do," noted Ginny. But they did catch up with their reading, and Ran even wrote the first 30,000 words of a novel—"a kind of a trashy thriller," he called it disparagingly. More conscientiously, he also wrote more than 500 letters to sponsors and another 200 letters about Expedition business. Most evenings, Charlie, Ran and Ginny would play cards for a couple of hours, and the relationship between all of them remained remarkably free of tension and argument. As Charlie said, "We had worked closely in preparation for the trip. We knew each other's moods and when to lay off. Therefore the strains were negligible."

The aircraft returned at the beginning of the Antarctic summer and the ice group left Borga on October 29, each snowmobile towing a 12-foot metal sledge with a 1,500-pound load. It was about 1,200 miles to the South Pole and another 1,000 miles on to Scott Base. Their route was largely untraveled and uncharted, so they wanted to give themselves as much time as possible in case anything went wrong. Also, the farther they could travel when it was still very cold, the more chance they had that the snowbridges over the crevasses would still be firm.

The temperature dropped suddenly to –67 degrees F and there was a 50-knot wind. They all suffered to some degree from frost-nipped faces and it was a relief when temperatures eased to about –22 degrees F again. Traveling was incredibly monotonous on the white, almost featureless plain, and navigation was difficult with so few prominent details in the landscape. They drove for 10 hours a day, with a five-min-

Team member rushes to pick up supplies dropped by Expedition aircraft, which was a vital link to base.

ute break every hour. Ran led the way, followed by Charlie. As the mechanic, Oliver brought up the rear so that he could see quickly if anyone needed help.

In case they were separated by bad weather, they each carried some kind of shelter, food, ropes, shovel, radio beacon and a small radio. They ate mostly dehydrated rations, with one main meal a day which they cooked when they camped. Ginny contacted them by radio every evening and was on standby during the day.

After 500 miles, a region of unusually high sastrugi barred their way. This is best described as a vast plowed field with sometimes up to five-foot furrows lying diagonally across the route. The ridgelines were often curled like breaking wave tops. The likeness ended there, for the ice was iron hard. Machines and sledges crashed down in the troughs, tow ropes snagged fast athwart the ridges. Lurching sideways off ridgelines, the vehicles often overturned. Anxious to avoid a crushed limb, with heavy clothing restricting movement, the driver would try to jump clear before a plunging sledge runner could slam down on him.

Auxiliary wheels, ski attachments and springs snapped and buckled. They carried limited spares. Ran's sledge runners were of solid oak, but a nine-foot-long split opened up along the length of the sledge and he had to abandon it and its load: this included the only tent heater and crevasse ladders. Luckily most of their sledges were of rigid stainless steel and, despite broken struts, held together for the entire journey. The nightmarish sastrugi continued for 300 miles.

Halfway between Borga and the South Pole, the problem of resupplying became acute. Giles Kershaw would have to build up a fuel dump at their location. Although time was vital, they had to camp for 17 days knowing that the crevasse zones ahead would be getting more and more treacherous with each passing day of sunlight.

In inflatable boat topped by radar reflector, Fiennes plows through heavy seas toward Yukon River.

The delay added to the chances of failure. Shortly before they had set out from Borga, a message from London had impressed upon Ran that the undertaking was considered by polar experts to be doomed to failure. He explained: "Some critics thought the plans were irresponsible because the snowmobiles were too small to pull the necessary loads and our Otter aircraft lacked the range to cope with the huge distances involved. The thought paramount in the minds of all the Antarctic authorities involved was that we would need a costly, perhaps hazardous, rescue."

Things turned out differently. As the Expedition

In background is *Benjamin Bowring*. Soon after picture was taken, the photographer's boat capsized.

got closer to the Pole, a 12-strong field party of South African scientists departing from the Sanae base set out on a 200-mile journey along the same inland route Ran and the others had followed the previous summer. The scientists lost two of their heavy caterpillar snow vehicles in the Hinge Zone. One man was killed. Three set out lightly-equipped to return to their base. They failed to turn up so the base leader set out by himself to search for them. He, too, was soon missing. Within a thousand miles there was no aircraft that could search for the lost men.

Giles Kershaw, recently arrived at the South Pole, flew to the very limits of the Twin Otter's endurance, more than 1,400 miles, located the tracks of the three men and later those of the base leader. Giles found them soaking wet and not far from death. He picked them up and returned them to Sanae.

After many days the three snowmobiles came to the South Pole. For seven days they rested there at the American base. The ice group set off again on December 23, keen to finish the crossing. Their main obstacle was the Scott Glacier, the crevasse-riddled slope down to the Ross Ice Shelf, which had never before been descended.

On the North Polar ice cap, Charles Burton pilots his snowmobile and sledge over a big pressure ridge.

Stretching his legs, Sir Ranulph hauls a lightweight fiberglass sledge across deep crevasse in the Arctic.

Once they started it was almost too dangerous to stop, and they kept driving for longer than usual. Oliver was towing two sledges and sometimes his snowmobile and both sledges were simultaneously crossing different crevasses. They could all feel the backs of their machines actually breaking through the snowbridges. Sometimes they were forced to bunch together and Ran would break the center of a crevasse as Charlie and Oliver broke down its edges.

The descent took them four days and then it was a relatively comfortable run of 600 miles to Scott Base and the end of their Antarctic journey. They arrived on January 11, 1981, 75 days after they had left Borga.

It was only the second-ever crossing of the continent —the first being by the Commonwealth Trans-Antarctic Expedition (1955-58) led by Sir Vivian Fuchs and Sir Edmund Hillary and backed by both the British and New Zealand governments. Transglobe had traveled farther and much faster. It was a good reply to the earlier criticism of their plans and equipment.

They were all in remarkably good shape, though thinner—Oliver had lost 28 pounds on the way to the Pole. Sadly, he had also decided that for domestic reasons he had to withdraw from the Expedition. The ice group was weaker without him.

Six weeks later the *Benjamin Bowring* approached the mouth of the Yukon River; I had rejoined the group for the start of the next major stage of the Expedition. The ship moved as close inshore as possible but because of the shoals we were still almost 12 miles from the Alaskan coast when the two inflatable boats were lowered. It was July 1 and we wanted to reach Dawson, some 1,300 miles upstream, in less than a fortnight. Every day lost increased the risk of being trapped by ice later in the Northwest Passage.

Ran led the way, with me as a passenger. Charlie kept close behind. We all wore orange survival suits and cowled hoods—like Day-Glo nuns, said a crewman on the ship. Each boat, only 13½ feet long and powered by a 40-hp engine, was carrying at least half a ton of fuel and supplies. We were very low in the water, the wind was rising and a heavy swell was building up. Ran asked me to move into Charlie's boat so that he could navigate undistracted.

The waves began to break over us, hitting us hard from behind. Often we were completely awash and I marveled at our buoyancy—a stubborn, muscular resilience that one could actually feel. But as we watched the other inflatable being pounded by the sea or disappearing into ten-foot-deep troughs, we had all too vivid an image of how vulnerable we were.

I turned to talk to Charlie and saw him lifted bodily by a surge of water and thrown clean over my head. As the boat capsized, I tugged my feet free of the fuel lines and jumped as far away from the propeller as I could. The hull crashed down beside me and I grabbed hold of a handgrip. Seconds later, Charlie was there too. He heaved himself out of the sea onto the upturned hull and hauled me up by the scruff of the neck.

We tried to right the boat, but without success. Seeing our problem, Ran lightened his craft by abandoning some jerricans and then moved alongside. Both inflatables were being tossed about violently and twice he was almost washed over us—we were only

inches out of the water. I kept a very wary eye on his propeller. It was like sharing a trampoline with a bacon-slicing machine.

Ran jumped onto our craft, we tied our two boats together, but the three of us failed to overturn the capsized hull. Another huge wave knocked us sprawling, our boats broke apart as a towing point ripped off, and Ran's inflatable was swept away.

"It would be so stupid to get drowned through something this silly," he said. "I'll go," offered Charlie, but Ran dived in and struck out after his boat, already 20 yards away and drifting fast. It was a brave swim in such a sea and we were relieved to see him climb aboard.

He flung us a line again and Charlie tied it to the rope loop on the far side of the hull. Ran drove off at right angles to us, Charlie and I heaved back on the rope simultaneously and our boat flipped over.

After its half-hour immersion, our engine would not start, so Ran towed us back to the ship. We ourselves were in better condition than might have been expected, thanks to our survival suits.

For the next 5,200 arduous miles the Expedition proceeded primarily by boat—both inflatable and sturdy Boston Whaler—up the Yukon River, down the Mackenzie River to its mouth, and through the Northwest Passage, where thick mists, gales and icebergs added to the problems. Finally, on August 31, 1981, 62 days after starting up the Yukon, Ran and Charlie reached Tanquary Fjord on Ellesmere Island. After being resupplied by air, they had to travel on foot across Ellesmere to their winter camp on the north coast—their starting point for the run to the North Pole.

For 150 miles they crept north on Ellesmere, bruised, cut and blistered, tramping through mountain passes, over high ice fields and beneath glaciers, until one cold morning they emerged from a narrow ravine to confront the chaotic pressure field: the Arctic Ocean, the last and greatest challenge to Transglobe.

For four months of darkness they wintered at the very edge of the ocean. Then, three weeks before the first polar sunrise of 1982, they set out on snowmobiles.

Soon the trouble began in earnest. Because the prevailing currents from the North Pole head south to the coast of Ellesmere Island, the ocean's ice cover backs up on itself in wave upon jumbled wave of broken blocks. An average wall may be some ten to 12 feet high, but walls of 30 feet are not uncommon. The snowmobiles could negotiate 12-to-14-inch obstacles but nothing more. And so for hour after hour they hacked a path through the rubble with axes. Ran decided to try man hauling until things got better. They left the snowmobiles behind and, with 160-pound loads on fiberglass sledges, inched painfully north.

After 70 miles the pressure fields eased a bit. Back at Ellesmere Island, Ginny had been joined by a new pilot, the Swiss Canadian Karl Z'berg, who then took the two snowmobiles on to Ran and Charlie. After dusk one evening, Ran swung away from some thin ice only to break through a snow-choked lead. His machine, sledge and all the equipment save for radio and theodolite (a navigation aid) sank quickly. With no tent they passed an unpleasant night. Ginny managed to find replacement items, which Karl promptly flew out to the team.

Fear of a splitting floe

Once a shock wave, exactly like that of a bomb blast, shook the floe. Ran and Charlie scrambled for the tent opening, both afraid the floe was splitting up. But there was no further movement. By day and night the noise on all sides was awesome. "The secret of living and traveling in so insecure, so fragile a place," Ran said later, "is to cut off your imagination; otherwise you become almost shell-shocked."

The team needed to reach the Pole quickly in order to stand a chance of crossing the ocean in one season. Through much luck, axing, shoveling, heaving, cursing and forgetting everything but the immediate obstacle, they came on Easter Sunday, April 11, 1982, to the top of the Earth. They still had about 1,000 miles to go to reach the faraway ice edge where the *Benjamin Bowring* was scheduled to arrive in early May. Every day was precious. Ran's original plan was to travel to the island of Spitsbergen before the ice breakup, normally in early June, ski over some moun-

Their goal achieved, on April 11, 1982, Burton (left) and Fiennes unfurl Union Jack at the North Pole.

tains to a fjord and meet the ship. This was not to be. The ice began to show signs of an early breakup. He decided to attempt a journey, at the whim of the winds and currents, on as safe-looking an ice floe as could be found *before* the breakup came.

For 99 days Charlie and Ran waited out the long hours. There was no night. Fear of bears kept life from becoming monotonous. In the Arctic summer, polar bears from Spitsbergen head out over the sea ice to hunt seals. Open leads give them no problem since they are at home in the ice-cold water. Bear prints have been spotted in the Arctic more than 500 miles north of the nearest land. During the 99-day float, 18 polar bears visited the camp, which consisted of two small tents pitched door to door with a narrow entry gap between them. One evening Charlie called from his tent; he had heard footsteps. He shouted, "A visitor!" Within minutes they were outside in woolen underwear and clutching weapons—Charlie a .375 bolt-action rifle, Ran a .44 magnum revolver.

The visitor was a polar bear

A lone bear waited a few paces behind the tents, staring at the men. A shot over its head had no effect. It padded slowly between jerricans and food boxes. For ten minutes the men clashed pots and pans together, shouted and fired more shots skyward. But the bear stayed put. Charlie had only two rifle bullets left. Ran had plenty of ammunition but a revolver is not considered very effective against a polar bear.

Ran knew from Canadian friends that a bear bent on attack should be stopped at least 40 paces away. Charlie lay on a sledge and took careful aim, just in case. Ran stood behind and to one side and fired an illuminating parachute flare. The rocket blasted over Charlie and struck the snow close to the bear, fizzing. The bear ignored it. Ran believed the animal was about to charge and fired the heavy revolver once. The bear stopped abruptly, hesitated for a moment, then moved off sideways and finally away. There were splashes of blood in the snow but the animal did not limp. It appeared to have a wound in its front leg. Ran and Charlie followed it for half a mile but it swam across a wide fracture and disappeared into the ice.

"I felt guilty," Ran said later. "Perhaps if I had not fired, it would not have attacked after all. Perhaps it would have been better to have shot to kill. On reflection, I think if I was the bear I would prefer to be alive with a sore leg for a while, but who can tell?"

Ran and Charlie were to drift 350 miles on the floe, ending up only ten miles from the Greenwich Meridian, the line that they had set out to follow around the globe. Twice the *Benjamin Bowring* tried to break through the great ice barrier to reach the men and

twice it failed. At the end of July the captain decided to try again. The weather had suddenly cleared and the wind had changed to a strong northwesterly, opening up channels between the ice floes. Sometimes the ship crashed through solid ice without any interference; other times it took an hour to progress 100 yards. Then, only ten miles from the ice group, the ship came to an impenetrable barrier of solid ice.

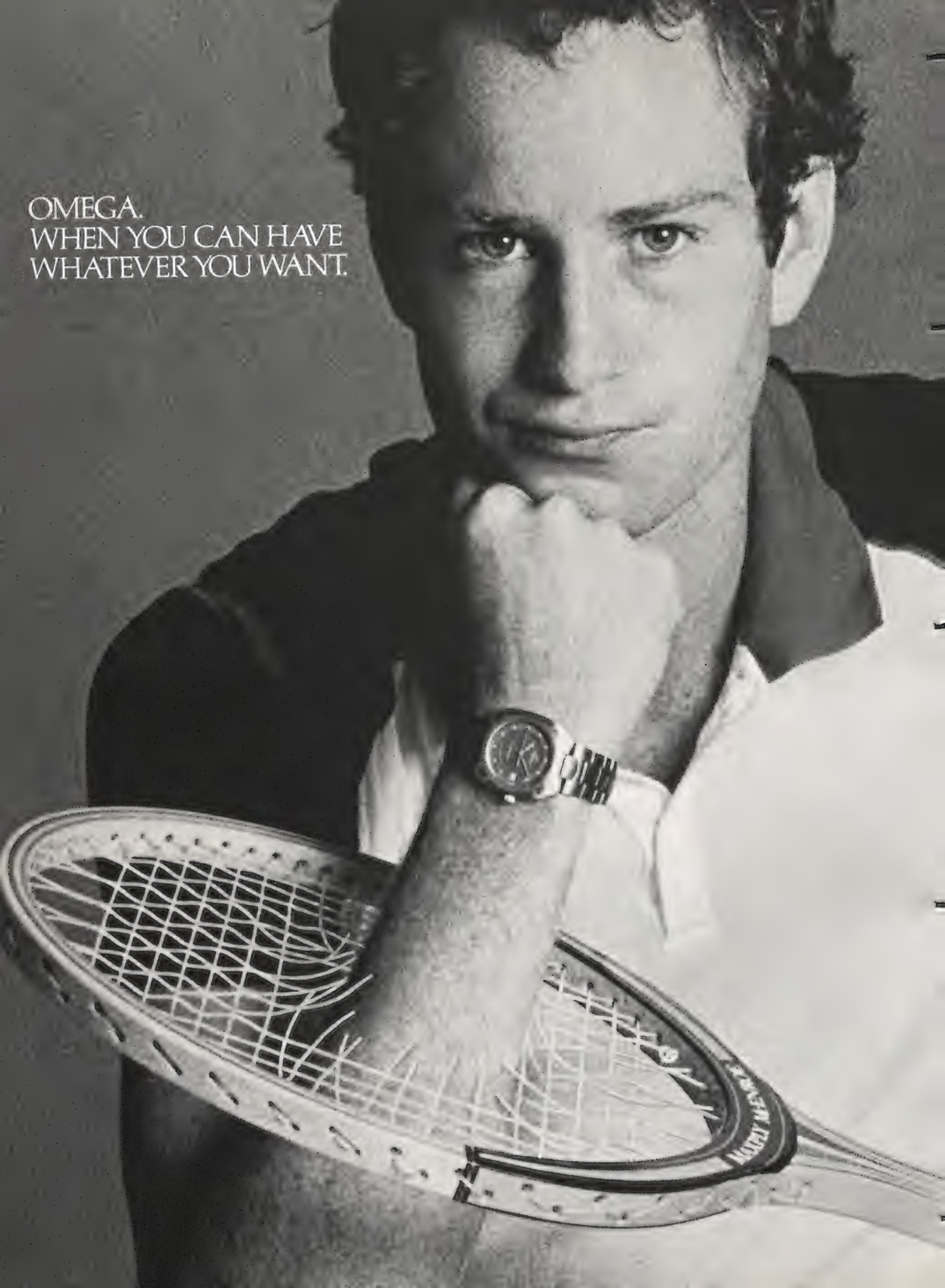
Charlie and Ran decided to try to reach the ship. With loads of 400 pounds apiece they hauled aluminum canoes—flown in by Karl on one of his last trips—over floes and rotten ice. When open leads blocked the route, they gingerly paddled across between the pressure walls. It was almost midnight when they were spotted from the *Benjamin Bowring*'s crow's nest. For a full hour we watched from the ship as the dots took shape in the no-man's-land of hummocky ice. We knew who they had to be but it was not until we could recognize their faces that the excitement erupted.

There they were. There they were at last, Ran and Charlie. Harnessed to their heavy canoes, they leaned their weight against the pull of the rope, straining forward. Ran stopped and broke out the Union Jack. Someone mischievously switched on a tape recorder and *The Eton Boating Song* (Ran went to Eton) quavered out across the ice.

Then they were with us. "This is the most beautiful sight I've ever seen!" shouted Ran. They climbed the rope ladder and embraced everyone as the champagne splashed. The celebrations went on all night.

The ship had a hard time getting free of the ice and did not reach Spitsbergen for another 11 days. Then it was home to England and a triumphal reception. On Sunday, August 29, 1982, Prince Charles welcomed the Transglobe Expedition back to Greenwich, almost exactly three years and some 35,000 miles since it had left. It had been a most remarkable adventure, circling the globe to take the hard way home.

The three-year journey nearing an end, Sir Ranulph drags canoe toward a rendezvous with the ship.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By Janis Johnson

Good times and bad for Art Deco on Miami Beach strip

One of the nation's youngest historic areas, with fine examples of the 1930s Moderne style, is the scene of a battle—to save or develop it

Still intact and proud, a row of Art Deco and Moderne buildings makes the Miami Beach skyline unique.

Every day that they can, William and Lillian Fine, in their late seventies, leave their tiny Miami Beach hotel room, ride the elevator to the chic mauve Art Deco lobby of the Victor Hotel and walk down Ocean Drive. Their stroll takes them through the Beach's so-called Art Deco District—around the echo-deco Cafe Cardozo, where young artists and media people hang out, along the oceanfront park that was once America's Riviera, beside porches lined with gossiping elders in aluminum chairs, past kosher butchers and Latin *cafeterias*. If they go as far as Lincoln Road, the original "Fifth Avenue of the South," they hear conversation thick with Yiddish and Spanish.

"I'd rather be on Ocean Drive than anywhere else because the air is nice," says Mrs. Fine. Through the windows of their fourth-floor room, they can catch a glimpse of regal palms and restful Lummus Park, which borders an aquamarine ocean.

From the same hotel, graphics designer Woody Vondracek, 36, studies the sea. "Every artist who ever worked here went through a tremendous change of attitude toward color," he says. "It opens up a new palette of vibrant, alive, fresh, crisp, popping colors

Curvilinear, colorful style that characterizes area design can be seen in windows of Breakwater Hotel.

Photographs by José Azel

that you can't ignore, colors you're surrounded by—sea green, sky blue, violet, gold. All of a sudden you understand that earth tones have no place in this area. The only thing in south Florida that is brown is dead or dying."

Vondracek was not even born when the district saw its heyday, yet his prints and illustrations recall the late 1930s when Deco and Moderne styles suggested romance and sophistication—face powder and seamed stockings, Panama hats and quaint cigarette boxes, moody blue mirrors and electrifying color contrasts. The Fines do not see it. Their generation of Jewish people who have lived in the tropical "Lower East Side" is dying off and not being replaced. Newcomers are mostly working-class Latins. A troublesome element of Cuban refugees from the Mariel boat lift in 1980 brought catcalls, loud auto mufflers and crime.

The neighborhood lies adjacent to a decaying development zone that has been under a construction moratorium for years. On some blocks, begging bums and alcoholics bring the Bowery to mind.

Southern Miami Beach, which embraces one of the nation's youngest 20th-century historic districts, has an architecturally distinctive past but a visually undelineated future. (Buildings in the district are essentially an eclectic mix of Streamlined Moderne, Art Deco, International and Mediterranean styles.) In 1979, the one square mile between 23rd Street on the north and Sixth Street on the south was entered in the National Register of Historic Places. This makes property owners eligible for tax benefits on commercial properties in the district and provides some protection against federally funded action.

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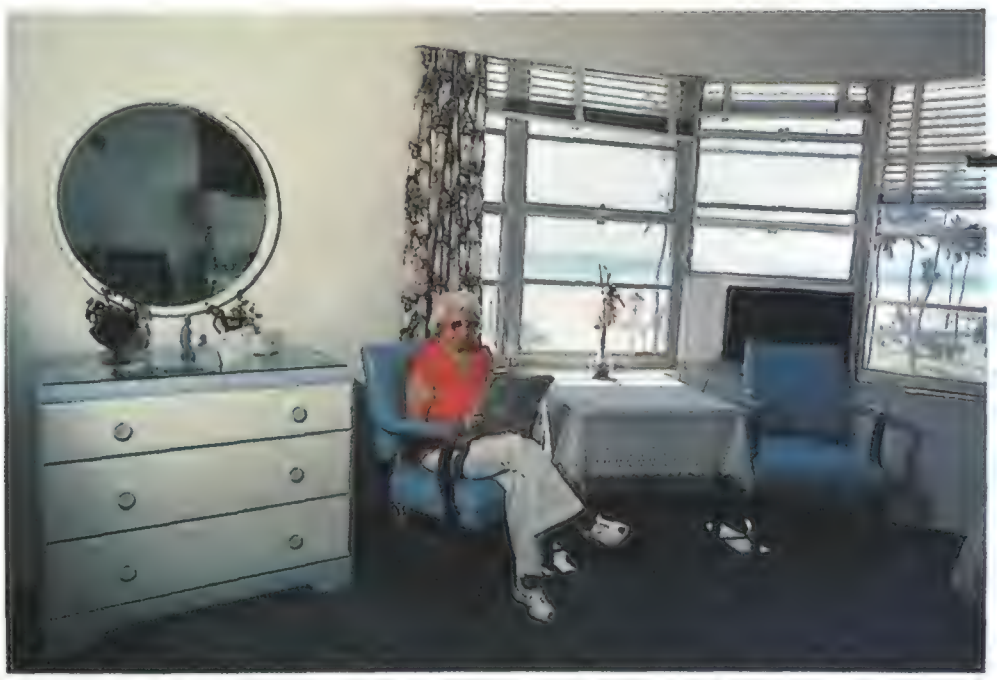
A waiter takes a break during quiet moment at Cafe Cardozo, favorite meeting place for artists.



A typical airy room at the Cardozo, which was built in 1939, provides a view of the ocean and palms.

Barbara Capitman, of Miami Design Preservation League, relaxes at home surrounded by Deco treasures.

Although some three-fourths of the structures, with their quirky shapes and fanciful facades, conform wholly or sufficiently to the Mediterranean, Art Deco and Streamlined Moderne styles of the 1920s through the '40s to justify National Register status, the district is locked in a struggle for survival. At one extreme are the developers, who own some of the property but regard the district simply as a valuable tract of land beneath out-of-date apartments and hotels. At the other are the preservationists, who believe that there is profit in the existing buildings as a backdrop for Miami Beach's version of the San Francisco Wharf area or Washington, D.C.'s Georgetown. City government has been only reluctantly involved.

To protect, or not to protect

After years of confrontation with the preservationists, developer-dominated interests convinced the Miami Beach City Commission last June to pass an "Art Deco ordinance" that provides virtually no protection for the district's buildings. A crucial clause stipulates that 100 percent of the owners of any area within Miami Beach must give their consent to the historic designation before that area can be preserved. "I don't see any property owners who want preservation," insisted Mayor Norman Ciment, an attorney who sided with the anti-Deco forces. "With the owner-consent provision, it is a very weak ordinance," says Stephen Dennis, assistant general counsel for the National Trust for Historic Preservation. "It is going to be difficult to protect the district adequately." He says he is not aware of any other such ordinance in the nation. The latest word, however, is that the ordinance has been disapproved by the state and county, and revisions are being considered.

The "big three" of Art Deco were New York City, Los Angeles (including Hollywood) and Miami Beach. New York's contributions were the Chrysler Building, Radio City Music Hall and other towering monuments to 20th-century industrial accomplishment. Hollywood's were the romance and rhinestone glitter in the films of Ginger Rogers and Fred Astaire. Miami Beach's was the resort—the tropical escape from Depression doldrums. Deco was a dream style.

On Miami Beach, the crisply modern designs harmonized with the Florida seascape in an economy of construction that offered luxury to the middle class. While the rich spent "the season" in their mansions and grand hotels like the Roney Plaza, the middle class populated three- and four-story hotels and apartment houses with friendlier names: the Barbara, the Evelyn, the Julie.

Lean but progressive, the buildings inspired delight. Racing stripes on facades reflected the speed-obsessed

Pennsylvania Avenue building has common motifs: glass bricks, metalwork door and cutout palm tree.

Resident comes through courtyard of Hotel Collins Park, where Clark Gable is said to have swept floors.

culture. Rounded corners made life smooth. Finials, parapets and tall signs lettered with hotel names reached for futuristic fantasies. Buildings shaped like ocean liners with porthole windows sailed you away. Flamingos, pelicans and herons were etched in glass (p. 59), stamped in metal screen doors, cast in plaster emblems. Organic friezes and stylized fountains placed tropical exotica at the front door. Cantilevered "eyebrows" over casement windows brought shade while permitting ocean breezes to filter into the small rooms.

Some structures survived from an earlier time, when the popular styles were Mediterranean Revival and Spanish Colonial. Many of them were damaged or destroyed in the hurricane of 1926. The 1939 World's Fair influenced space-age visions: architectural details emulated Buck Rogers' optimism about the range of human achievement; the needlelike "obelisk"—the Trylon—probably served as inspiration for the front of the Plymouth Hotel. By 1940, ribbon windows and other hallmarks of the International style had caught on.

But guarding visual esthetics is not part of Miami Beach's boomtown tradition. With each new burst of development comes more demolition of the past. Without the endorsements of city hall, designs for revitalization gather dust.

Abe Resnick dealt the first major blow to Art Deco. When Resnick, builder of some 60 functional properties on Miami Beach, tore down the New Yorker Hotel in May 1981, preservationists were stupefied. Built by Henry Hohauser in 1940, the seven-story gem was a monument to the period. Today the lot stands empty.

"On Miami Beach, land values far outweigh building values," says Monte S. Lee, former director of planning for the city. In 1980, construction volume soared to $150 million compared with $50 million in 1979, he explains. "You cannot control the private sector. You can't tell someone, 'Don't build.' When you have those economics, preservation is hard to sell. That's really the issue, the dollars and cents of it."

Already some believers among the skeptics have tackled the job with the pioneer spirit that has stoked local dreams from the beginning. Linda Polansky, now

Fanciful decorative detailing makes Congress Hotel on Ocean Drive a good example of the era's style.

in her early thirties, bought the 57-year-old Clay complex in an area known as the "Spanish Village" for $775,000 three years ago. She cleaned out the flophouse and began upgrading the block of connected buildings; it now incorporates a hotel, residences, a youth hostel and shops. In 1979, Andrew Capitman and Mark Shantzis, then in their late twenties, bought the first of their Art Deco hotels. They paid $800,000 for the 70-room Cardozo, named after the late Supreme Court Justice, Benjamin N. Cardozo, and site of exterior scenes in Frank Sinatra's 1959 film, *A Hole in the Head*. Today, under the aegis of Art Deco Hotels, Ltd., they and another partner have invested $11 million in seven properties. "I view myself as being in a race," says Capitman. "Can I buy enough property, restore it, open restaurants and promote the Art Deco theme before people come in with the condos?"

About three miles from the mainland, Miami Beach was only a sand spit and mangrove swamp before Henry Lum, his son and other investors tried in the early 1880s to start a coconut-palm plantation. That failed but, 30 years later, Prest-O-Lite magnate Carl G. Fisher saw the prospects for an exclusive resort. By the mid-1920s, the beach had at least 234 hotels and apartment houses, eight bathing pavilions and casinos, and four polo fields. Fisher's hotels pampered their guests. He wooed America's commercial royalty—the Firestones, the Penneys, the Champions, among others —who built or bought mansions along Millionaires' Row. He even tried to import flamingos, but they died in transit from the Bahamas and Africa.

In 1926, E. Nash Mathews moved his family from Cleveland. He opened Washington Storage Company, an off-season warehouse for the interiors of millionaires' mansions. "When customers wanted to come for the season, they called us," says Michel Mathews, a grandson who manages the business. "We went in, removed the shutters, hired the domestics, did the landscaping, turned on the telephone." Washington Storage employees met clients at the train station, cleaned and rewove rugs, built and repaired furniture, washed windows and polished silver. One of the com-

Chandelier accents lobby of Senator Hotel. Built in 1939, hotel was designed by architect L. Murray Dixon.

Pure simplicity of Primrose Hotel, in Deco style, stands out against towering housing project nearby.

pany's most notorious customers was the local gambling syndicate. Recalls Jim Mathews, Michel's father: "We picked up the gambling equipment before the raids and redelivered it afterward."

Post-Depression recovery was dazzling. Between 1930 and 1940, the permanent population swelled from 6,500 to 28,000 and annual winter visitors numbered 75,000. Big stars performed in the uptown clubs. The beach was still "restricted": blacks were emphatically not welcome and it was not uncommon to see signs at some hotels, "Gentiles Only." Lincoln Road was lined with chauffeur-driven cars. "I was not allowed to walk to Lincoln Road without wearing party shoes, gloves and a little hat," recalls Caryl Unger, who has lived most of her life in Miami Beach. At the Lincoln Theater "they'd serve demitasse as a courtesy before the show."

Color everywhere—pastels outside, bright hues inside—was the background for glamour. "Designs were as vacationlike as you could think of," says Earl La Pan, 74, one of the busiest muralists of the period, who arrived with his bride in 1934. La Pan, who sculpts and paints from his home in nearby Dania, practiced his art in 25 or 30 of the small hotels designed by the area's chief architects.

Good old days on the Beach

There was so much work between the end of the hurricane season in November and the beginning of the party season in January that muralists worked day and night, even during nightclub performances. One was Paul Silverthorne, who hitchhiked to Miami Beach months after painting scenery and sets for the 1939 World's Fair. He landed on a Friday night in November with only a couple of dollars in his pocket. Before long, he could not spend his money fast enough. He did work for some of the area's hotels and exclusive clubs—and occasionally for nightspots run by shady characters. "I never had a contract, just a handshake," he says. "They owned some of the cocktail bars and lounges where I made my living. I could go out and buy $200 suits. I went dancing practically every night. You could go out on Ocean Drive and every patio had music, people in double-breasted suits and Panama hats. There was an excitement about the place."

Two years ago, when the El Chico Club was to be torn down, Silverthorne, now a part-time interior designer, went to look for the ten panels of Mexican scenes he and partner Wilho H. Anderson had painted. Heat from a fire had fused wallpaper to the murals. "When I tried to pull the paper off," Silverthorne says, "it crumbled in my hands. That was the last one of my jobs that was still around. There is nothing left."

This palm-tree address plate adorns Palmer House on Collins Avenue.

Marine motif, a blue porthole, was another common touch.

Abstract sun decorates a screen door of the Dulce Apartments.

La Pan has been somewhat luckier. A few of his murals and sculptures remain. One of the loveliest, a painting of lush Everglades birds and plants, hangs above the lobby in the Victor Hotel, whose restoration has become a symbol of the potential for a revitalized Art Deco district.

When World War II hit, hotels were abandoned to the military. U-boats were spotted offshore. Rooftops of hotels became lookout posts, and blackout curtains covered the windows. A chef at the Royal Palm saw a ship burning on the horizon. The golf course became a training ground with sand-trap bunkers. Cpl. Clark Gable was stationed at the Beach while attending Officer Candidate School.

"There are two things really important about this place: its scale and the fact that it is a neighborhood," says Margaret Doyle, director of restoration and design for Art Deco Hotels. "I'm from New York. I lived in New York all my life. This is like the sixth borough. There are lots of delicatessens and bakeries. Three languages familiar to me are spoken here—English, Spanish and Yiddish."

Victor Miller, a Jewish judge in Miami Beach, is the namesake of the Victor Hotel. His father, Louis Miller, built the Victor in 1937 and occupied the penthouse, now the eighth-floor offices of Art Deco Hotels. Tenants were middle-class Jews, food was kosher and an orchestra played for dinner—at which women wore long dresses.

Margaret Doyle, who attended Columbia University's graduate historic-preservation program and has worked for the federal Heritage Conservation and Recreation Service, began the Victor restoration in 1980. Six rugs had been nailed down over the lobby's terrazzo floor. The front of the lobby had been covered with red flocked and baby-blue-and-silver papers. Balcony railings and all of the lighting fixtures had been sprayed with brass paint; they included three elongated copper-chromed chandeliers, nine chandeliers resembling upside-down Flash Gordon hats and 16 wall sconces.

For an "interpretative restoration," Margaret Doyle matched wall colors to the varied burgundies and greens and the off-white and gold of the terrazzo patterns and hues in La Pan's mural. Chrome chandeliers and fixtures have been returned to their original condition. Wooden chairs with stuffed seats are refurbished. Decorative metal now sports maroon auto paint. The cove ceiling in the oval dining room contains its original neon lighting.

Ethnic change has both enriched and disturbed the Art Deco District. Spanish-American Jewish food was recently featured at a lunch counter where one platter held fried fish, black beans and rice; another, a corned-beef sandwich. The Royal Hungarian Kosher Restaurant still does a brisk business after 36 years. Blue bottles with metal spouts—they hold seltzer water—decorate white linen tablecloths. Two hundred seats for the Passover seders sell out in two weeks. The two seasons before the 1980 Cuban boat lift were the best ever for Royal Hungarian business, but the two seasons after have been disappointing.

In the early 1970s the elderly population of the South Beach neighborhood, which includes the Deco district, was about 25,000—most of the residents, according to Nathan Skolnick, director of planning and budgeting for the Greater Miami Jewish Federation. Today, he estimates, the figure is down, and most of those remaining are more than 75 years old. The average income is $7-$9,000 annually, "with many below $5,000, and a few at $10,000 or more," he adds. They generally pay from $100 to $300 a month for rent and eat scantily on Social Security payments from their former jobs as factory workers, post office employees,

garment workers or as owners of small candy shops.

"The amazing thing is the spirit of the people," says Skolnick. "They go out and find their buddies in the park or they sit and talk on the porches. They go home at night and turn on the TV and eat their cornflakes and yesterday's bread. They've lived so long, they've learned to adjust. Many of them faced pogroms in Eastern Europe, and living in New York isn't that great either."

Take Anna Schwartz, 81, an employee at a neighborhood Jewish Community Center. "I used to go to the beach at 7 A.M., come back by 8, make my breakfast and come to work," she recounts. "I went into the water. The salt water peps up old people, because of the arthritis. Last year I stopped going to the beach." She explains that it is a long walk and that she is afraid. A widow from Brooklyn, she retired to the Miami area 30 years ago. "Now it's just murder. We went to a friend's house the other night to have tea and cake and when we went into the kitchen, the screen was cut . . . I was robbed a few times . . . we would sit out on the patio and tell jokes and have a good time. Then it got so you couldn't sit out." To Anna Schwartz's peers, Art Deco is little more than a fad for the youthful newcomers.

And it is the younger crowd that comes to buy at Definitely Deco, first commercial tenant in the Washington Storage building, with its Spanish baroque facade. Older residents passing with their groceries peer curiously at Marilyn Howland's stock of retro art, furniture, housewares and clothing.

"The old people who grew up with the stuff think it's junk," says Howland. "But lots of tourists and young people come who remember their grandparents' things. The developers want to build condos," she adds with a grimace. "They don't realize what they have. The flavor that is here is a tropical Deco. That's very marketable. It's been proved with the store."

"Art Deco is probably the most vulnerable of the design styles," says Barbara Capitman, a stalwart of the Miami Beach movement. "It keeps getting torn down and covered up because not enough has been written about it to develop an appreciation." As a leader of the Miami Design Preservation League, which helped win the historical designation for the district, she is also founding president of the Art Deco Societies of America. Her intransigence on the Deco theme has attracted admirers and fostered enemies. She is personally enveloped by Deco, from a bathroom in lavender tile with a hexagonal tub, to the Deco fireplace and the Bauhaus wooden table in her living room (p. 61), to the period portrait of David Oppenheim, the clarinetist who was her friend Judy Holliday's husband. From her rooftop veranda, Barbara Capitman can see the moon over Miami and Deco spires punctuating the low skyline. "There is a 50-50 chance we will lose it," she says sadly.

As a young settlement by the rest of the nation's standards, southern Florida lacks the visually provocative relics which are indeed old. But its culture remains almost original, along with the water, the light and the architecture of a still salvageable spirit of a contemporary American time. "Pretty soon, we're going to be in the 21st century," says Diane Woolfe Camber, director of the City of Miami Beach Bass Museum of Art. "Why not start preserving some of the 20th?" This kind of thinking prompts a wry question from at least one Miami veteran: "Can you make old new? I wish they could restore me!"

In the old days it was hot dogs, bagels and Eskimo Pies; now, it's Latin food at this beach stand.

Built in 1947—a latecomer—$1,300,000 Delano was a queen of hotels. It has since come down in the world.

DIANO

The Dispersion Analysis

Exhaust dispersion near a roadway is influenced by the turbulence and heat generated by moving vehicles. Findings at the General Motors Research Laboratories have provided a new understanding of the dispersion process.

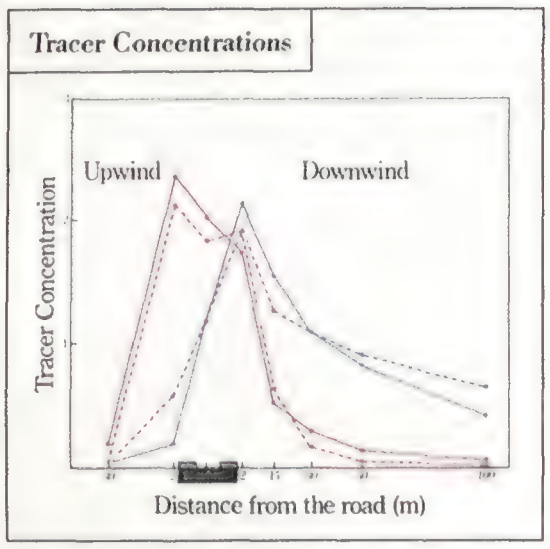


Figure 1: Observed (solid lines) and predicted (dashed lines) tracer concentrations near ground level as a function of distance from the edge of the road. Blue lines indicate the case in which the wind is perpendicular to the road; red lines, when the wind is nearly parallel to the road and opposing the upwind-lane traffic.

Figure 2: This representation of a roadway viewed from above shows the location of large vortices formed by local wind shear when the wind opposes the upwind-lane traffic.

BY USING the conservation-of-mass equation, one can describe the dispersion of gaseous molecules in the atmosphere. The equation includes terms for advection, diffusion, sources and sinks. Advection is the transport of air parcels by the mean wind; diffusion is due mainly to turbulent mixing. But the equation is useful only if we have information about the wind and temperature fields in the atmosphere. Specifically, our ability to predict vehicular exhaust concentrations near a road depends on knowledge of the effects of vehicles on these fields.

The conservation-of-mass equation for the mean concentration of any species, C, is

$$\frac{\partial C}{\partial t} + \sum_i \frac{\partial (U_i C)}{\partial x_j} = \sum_{i,j} \frac{\partial}{\partial x_j}\left(K_{ij}\frac{\partial C}{\partial x_j}\right) + So + Si$$

Local rate of change — Advection — Diffusion — Sources — Sinks

where U_i is the mean wind velocity and K_{ij} is the eddy diffusivity tensor. This equation applies when the length scale of mixing is small compared to that of the variation of the mean concentration. Near a road, this condition is met if the averaging time for the concentration and wind velocity is much longer than the time interval of vehicular passage. For a straight roadway, a long averaging time allows one to assume spatial uniformity in the direction parallel to the road, and to ignore the spatial derivatives in that direction.

The input information for K_{ij} and the mean crossroad and vertical wind components near a roadway became available as a result of a large-scale experiment conducted by the General Motors Research Laboratories. The experiment has provided an understanding of the influence of moving vehicles on mechanical turbulence and buoyancy near a roadway. Dr. David Chock was responsible for the design of the experiment and the analysis of the data. The experiment, which duplicated a heavily traveled, level roadway, was conducted under meterological conditions minimizing dispersion.

Moving vehicles affect the mean crossroad and vertical wind components in the following ways. Vehicles act as an obstacle to the mean wind, causing it to slow and move upward as it approaches the vehicles and downward as it leaves the road. In addition, vehicles release heat, which causes a net upward motion. It was established that the increase in the mean vertical wind component due to the exhaust heat was $(B/U)^{\frac{1}{3}}$ where U is the crossroad wind component.

The buoyancy flux, B, is proportional to the heat emission rate of the vehicles.

Moving vehicles also enhance both turbulence intensity and mixing. To determine how this modifies the eddy diffusivity tensor, K_{ij}, Dr. Chock invoked a "second-order closure" assumption, which relates eddy diffusivity to Reynolds stresses and the gradients of mean wind velocity and mean temperature. Eddy diffusivity was assumed to be the sum of ambient and traffic contributions. To determine the traffic contribution, the length scale of the traffic-induced turbulence was assumed to be comparable to vehicle height—1.5 m.

USING THE vast data base compiled during the experiment, Dr. Chock was able to specify K_{ij} and the mean crossroad and vertical wind components, and solve the equation numerically. To test the model, half-hour measurements of a tracer gas were used to map out experimentally the exhaust dispersion under various meteorological conditions. The case where the wind speed is low and the wind direction is nearly perpendicular to the roadway is represented by the blue lines in Figure 1. Both the model and the experiment show the same dispersion pattern. The peak concentration is on the downwind roadside.

When the wind is nearly parallel to the road, the situation is much more complicated. Figure 2 shows that when the wind and traffic flow on the upwind lanes oppose each other, a high shear region occurs immediately upwind of the first traffic lane. When the wind and traffic are in the same direction, the high shear region occurs in the median of the road. In these high shear regions, large eddies are generated and turbulent mixing is intense. The red lines in Figure 1 show a comparison of the model's predictions with the tracer data for the case illustrated by Figure 2. Notice that the peak concentration can actually occur on the upwind roadside, due to the exhaust transport by these large eddies. Dr. Chock's model is the first to predict this occurrence.

Under all combinations of wind speeds and directions, the predictions based on the model compare favorably with the measured tracer concentrations. There is little systematic bias with respect to wind direction.

"In light of this new model, exhaust dispersion near a roadway can now be predicted with reliability," says Dr. Chock. "This is of importance for environmentally sound road planning, and opens the door to the investigation of dispersion on city streets, where the presence of tall structures introduces even further complexity."

THE MAN BEHIND THE WORK

Dr. David Chock is a Senior Staff Research Scientist in the Environmental Science Department at the General Motors Research Laboratories.

Dr. Chock received his Ph.D. in Chemical Physics from the University of Chicago. His thesis concerned the quantum mechanics of molecules and molecular crystals. As a Postdoctoral Fellow at the Free University of Brussels, he did research work on the dynamics of critical phenomena. He did additional postdoctoral work in the fields of solid-state physics and fluid dynamics.

Dr. Chock joined the corporation in 1972. He is leader of the GM atmospheric modeling group. His current research interests include the phenomena of atmospheric transport and reactions, and the statistical study of time-series data.

General Motors

GM

MARK OF EXCELLENCE

Vauxhall/Opel/Holden/Bedford Truck/
Chevrolet/Pontiac/Oldsmobile/
Buick/Cadillac/GMC Truck

By William C. Davis

The cruel odyssey of Rebel statesman John Breckinridge

This former American Vice President braved storms and mosquitoes, Yankees and renegades, in his flight to freedom

On May 6, 1865, near Washington, Georgia, one of the last confrontations in the American Civil War came to a peaceful conclusion. A small body of Confederate cavalry met 250 mounted Federal troopers. The Confederate commander went forward for parley. Lee had surrendered; so had the only other substantial Confederate force east of the Alleghenies.

Now this Confederate colonel, W. C. P. Breckinridge, was buying time. Less than a mile behind him, shaded in the woods, a dozen men prepared for a desperate dash to escape the country. Their leader, one of the most admired Americans of his time, was the colonel's cousin, John C. Breckinridge of Kentucky, Secretary of War of the Confederacy, former Vice President of the United States, Presidential nominee of the Southern Democrats in 1860. He was defeated by Lincoln and immediately took one of Kentucky's Senate seats. He was loyal to the Union, but Federal authorities feared he might lead Kentucky into the Confederacy and ordered his arrest.

Friends warned young Senator Breckinridge in time. To avoid capture, he went over to the Confederacy, though privately admitting that he disapproved of secession and did not believe that the South had a chance. Untrained in military ways, Breckinridge rose to major general, then became Secretary of War in February 1865. He could do little except strive for an honorable surrender. Breckinridge directed the evacuation of Richmond, the removal of the Confederate government and the escape of President Jefferson Davis. (He expected to meet the Davis party later near the Florida line, but the President was not to keep the appointment: he and his followers were to be captured by pursuing Federals.) Now Breckinridge must escape himself, for in several northern states, the former Vice President faced indictment for treason and could probably expect a short trial and a long rope.

With Breckinridge now, waiting in the woods, were his sons Cabell and Clifton, his aide James B. Clay, his old adjutant and friend, Col. James Wilson, and his black servant Tom Ferguson. Half a dozen others, mostly Kentuckians, planned to ride toward the Florida border to distract Federal attention from Davis.

When his cousin sent word that the Union cavalry demanded surrender, Breckinridge knew that this was the moment to begin his dash southward. He sent back word to his cousin that it would be "folly to think of holding out longer." The cavalry unit should give up and go home. Then he turned his horse toward the south and, followed by his little band, rode off.

Breckinridge's face was well known, so he shaved off the flowing moustache that had been widely celebrated in the Confederate army, and adopted the alias of Colonel Cabell. They made 40 miles that first day, decided to aim for Madison, Florida, a reputed haven for Southern refugees, and Breckinridge sent young Clay and his own son, Clifton, on their way home.

The road to Madison proved long and dangerous. Rain slowed progress on May 9, but two hours after dark the party reached the Oconee River near Dublin, Georgia, and camped. Exhausted, they were sound asleep at midnight when they heard a Federal patrol pass within 100 yards.

"A very pert gentleman" was Breckinridge

They left before dawn, yet it was hours past sunset when they stopped for the night, several miles short of their goal. All now shook with chills and fever and the next morning found their mounts broken down. A farmhouse provided shelter and a meal. The lady of the house gave Breckinridge a room where he slept soundly throughout much of the day, but word of an important stranger's arrival soon spread. He awoke that evening to find the house filled with curious people come to see him. Only his hosts knew his real identity, and they kept his confidence, but the general delighted in an evening spent listening to a roomful of Georgians speculating on who he was. Next morning, when they rode off, Breckinridge's hostess re-

Leaving most of his staff behind, Breckinridge sets off through pinewoods on the trail to Florida.

Illustrations by Eric von Schmidt

marked that he had been "a very pert gentleman."

Upon reaching the Ocmulgee River, the party rested in the shade of some trees while waiting for the ferry. Tom Ferguson spread a blanket on the ground for the general, who took from his saddlebag a copy of Plutarch's *Rise and Fall of Athens*. Breckinridge's interests reached into the sciences and to archaeology. When Vice President, he had served for four years on the Smithsonian's Board of Regents.

When at last all of his party had crossed except himself and Wilson, the general was found standing on the bank looking to the west. He told Wilson to wait, then recited the lines of a popular poem, "Oh! Come to the South." Its last stanza must have deeply moved him as he prepared to ride away:

> Oh! here would thy beauty most brilliantly beam,
> And life pass away like some delicate dream;
> Each wish of thy heart should realized be,
> And this beautiful land seem an Eden to thee.

At Milltown, near the Florida line, they waited for Davis. Then came word of his capture—and news that Federal patrols were closing in on Breckinridge. He was now the last functioning member of the Confederate government. There was no use his waiting and no need for his escort. He sent them home, save Wilson, Tom Ferguson and his son Cabell. The next day they rode to Madison, bent on getting out of the newly conquered South.

They found help in abundance. Breckinridge met with Gen. Joseph J. Finegan, and soon they were joined by Capt. John Taylor Wood, a member of Davis' escort who had barely avoided capture with the President. Wood's record was almost unsurpassed as commander of the Rebel raider CSS *Tallahassee*. Accused of piracy, he was now making his escape.

They decided to join forces, travel down the east coast of Florida along the inland waterway, secure a boat and sail to Bermuda or the Bahamas. Leaving Wood and Wilson to make preparations, Breckinridge risked going into Madison to buy supplies. A Federal lieutenant there perhaps saw something familiar about him, for he followed the general. Finally he planted himself in front of the Kentuckian.

"Then Breckinridge showed what stuff he was made of," wrote a witness. Drawing himself up to his full six-foot height, the general faced the Yankee with his deep-set blue eyes, haunting eyes that in days past had almost mesmerized crowds of voters. Breckinridge "gave him a look," said a bystander. "The effect was magical." The Federal turned away.

Here, too, Cabell left them, his health unable to risk the swarms of mosquitoes in the rivers and swamps ahead. By May 18 the party was in Gainesville and met Col. J. J. Dickison, "the swamp fox of the Confederacy." He knew every stream and hidden path and set them a course down the St. Johns River, offering a lifeboat that he had captured sometime before.

Led by Breckinridge's cousin, a small force of rebel cavalry prepares to parley with Federal troopers.

Nearly a week passed while Dickison raised the boat from a lake where he had sunk it, and the others gathered supplies. It was afternoon on May 26 when Breckinridge, Wood, Ferguson, Wilson and a guide sent by Dickison reached Fort Butler on the St. Johns and found their boat waiting. Waiting, too, were three Confederates who would go with them: Sgt. Joseph O'Toole, Cpl. Richard Russell and Pvt. P. Murphy. The boat was barely 18 feet long, an open craft with four oars and a step for a mast—not much for seven men to take out to the open sea.

The last official act of the Confederacy

Breckinridge wanted to show his gratitude to the guide, Lt. William McCardell, for leading them to the vessel. "I have but a few more hours of authority," he said, "but such services as you have rendered your country deserve reward. You shall be a major; I will make out your commission now."

McCardell did not seem to be pleased.

"Well, my friend?" asked Breckinridge.

"Well, you see, gineral, thar's a feller in our regiment what hain't done nothin', and he is a major and a quartermaster; and if it's all the same to you, I would just like to rank him for oncet."

At once Breckinridge wrote a commission for lieutenant colonel. This was the last official act of the Confederate States of America—a promotion on the swampy banks of the St. Johns given half in jest to an officer who, it turned out, had already surrendered to and taken parole from the Federals.

By 4 o'clock they were on their way, the water nearly slopping over the gunwales. That night a storm forced them to anchor in midstream. Crammed with supplies, the small boat afforded no room to lie down. The men slept sitting, to find in the morning that the rain had spoiled much of their powder and food.

There followed two more days of hard rowing and sleeping in midstream at night to avoid mosquitoes. "St. Johns River is the most crooked and bewildering stream I ever saw," Breckinridge complained. Often they took false channels. Cranes and pelicans abounded, and so did alligators, sullenly following in their wake or crossing their bow. Sour oranges found along the banks, added to the remnant of their dirty brown sugar, made a "very miserable lemonade."

On May 29 they reached Cook's Ferry, where they would have to cross about 20 miles overland to gain the Indian River. They engaged a local man to haul the boat on a makeshift wagon. It took two days for the portage. At night they built a fire and sat in its smoke to avoid insects. On the last day of May they launched the boat at Carlisle's Landing, which was near Cape Canaveral.

Crammed aboard an 18-foot boat, the party rows down the St. Johns River toward the open Atlantic.

The Indian River is an arm of the Atlantic running 120 miles along Florida's coast, behind a strip of land only a few hundred yards wide. The fugitives soon discovered that the water was too brackish to drink. At night they had to dig holes in the sand and wait for fresh water to trickle in. They covered 50 miles on June 1, their best day yet, but by evening they were fighting for their lives against the dread mosquitoes.

"I cannot give you any adequate idea of these insects," Breckinridge told one of his sons later. "They attacked us, not two or three at a time, but in swarms incessantly the whole night long. Both hands were kept going and still they bit us. With his arms tied and

Publisher-author William C. Davis has written The Deep Waters of the Proud, *first volume of a planned trilogy focused on the Civil War.*

Through gloomy swamps the Confederates portaged from the St. Johns to the Indian River.

When Seminoles appeared on the Florida sands, the Breckinridge party swapped powder for bread.

his face exposed, I am sure they would kill a man in two nights."

Finally they went ashore and buried themselves in the sand, with caps drawn over their faces. The general feared they might well die of brain fever if they did not escape the insects soon.

They made good progress in the next few days. At Indian Inlet, a break in the sandspit, they had to pass a Yankee guard post near Fort Pierce. "Approaching cautiously, with muffled oars," recalled Breckinridge, "we saw a fire on the bank." They huddled low in the boat, kept to the middle of the stream, and silently glided past the guards at the campfire.

Next day it was time to cross the sand and brave the Atlantic. Above Jupiter Inlet, where the spit was only 50 yards wide, they went ashore and manhandled the boat across to the ocean. That afternoon they proceeded south, hugging the coastline, anxiously aware of frequent steamers toward the horizon. They rested most of the next day, preparing for their 70-mile run to Grand Bahama Island. Food was now nearly gone. Breckinridge and the others dug for turtle eggs and walked inland for fresh water. Late that afternoon Wood read prayers and they began their ocean voyage. But an east wind beat them back so that by the next dawn they were still in sight of land.

Worse, they were in sight of a U.S. naval steamer heading directly for them. They hurriedly rowed back to shore and rushed into the brush hoping the enemy would pass them by. But they had been seen. Breckin-

ridge wanted to retreat farther inland, but Wood knew that the Yankees would destroy the boat.

Finally Breckinridge, the most easily recognized, took his pistols and withdrew deeper into the brush, while Wood, Russell and O'Toole boldly rowed back out to confront the Federals. Pretending to be simple salvagers and acting "stupid," they duped the Yankees into leaving them unmolested.

The wind did not cooperate so well. By June 6 the fugitives were still in sight of land. They met a band of Seminoles along the shore and managed to exchange gunpowder for an Indian bread called *kunti*, "a little thicker than a pancake and ten times as tough," commented the general.

Later that day Breckinridge spotted another boat that turned as if to run away. The general at once suspected that it held deserters from one army or another, and soon the fugitives became the hunters. Wood managed to maneuver their boat to overhaul the other, then sent a pistol shot across its bow. Certain that the quarry were Federal deserters, Breckinridge decided to appropriate their larger craft. Turning pirate, he and Wood boarded her and ordered the leader of the deserters to step forward. When he hesitated, the general drew his pistol and told Major Wilson to disarm the fellow. Then Breckinridge "put on a bold air and threatened the rascals with all sorts of dreadful things, but finally relented so far as to offer to let them go with an exchange of boats!"

The deserters were delighted with the deal, for their captors looked desperate enough for anything. Breckinridge, unshaven, browned by the sun and gaunt from malnutrition, was the image of a freebooter. Yet after the exchange was done, he gave the deserters $20 from his dwindling purse.

Everyone seemed pleased with the whole affair. It was a better boat for the ocean, and Major Wilson took such a fancy to piracy that he promised they would trade their way up to a steamship, regretting only that they had not forced the deserters to walk the plank.

They decided to make for Cuba, a long and perilous voyage, but at least with a favorable wind. By June 7 they reached Fort Dallas, future site of Miami, where they hoped to trade for supplies. But as they neared the wharf, they were met by about 30 desperate-looking renegades of several nationalities and, deciding not to risk landing, moved down the coast. Several canoes full of the renegades gave pursuit.

Outnumbered three to one, Breckinridge and Wood opened fire with their rifles, each taking a turn. With at least one man hit, the renegades broke off the chase. O'Toole took the gamble of setting off for Fort Dallas to buy supplies with $50 in gold. He was taken to a "Major Valdez" for cross-examination. Valdez claimed he had been a Federal officer and still had authority. After two hours waiting, the others decided O'Toole must have been robbed and slain, and were about to continue their journey when they saw him approaching in a canoe. He had hoodwinked Valdez and now brought flour, hams, fruit, salt pork, yams, fresh water

Turning pirates themselves, Breckinridge and Wilson capture larger, better boat from Yankee deserters.

and a little rum. That night they all devoured a meal that Wood found "more enjoyable than any ever eaten at Delmonico's."

More dangers awaited them. A renegade schooner was to trail them for three or four hours until the shallow draft of their boat enabled the Confederates to escape. They rested, filling their larder with turtle eggs and coconuts. Murphy had left the party some time earlier and Russell and O'Toole were reluctant to cross the ocean until Breckinridge used some eloquent persuasion. In the afternoon they set sail and by midnight they were well out to sea.

For two or three hours they snaked their way through reefs and small islets; then the seas grew heavier, water often breaking across the bow and drenching the six men. Just before dawn, O'Toole and Russell were in the bilge, seasick. Ferguson and Breckinridge slept; Wood sat in the bow. "I was tired and just losing myself in a doze," wrote the general, "and the celebrated Colonel Wilson was steering." At once Breckinridge felt a huge wave going over him, nearly filling the boat. He looked up to see that Wood had fallen overboard, and Wilson was "as stiff as a stanchion holding on like grim death to the rudder and the sail rope." His grip, in fact, was about to sink them. Breckinridge shouted to him to let go the sheet, and the boat righted. Fortunately Wood managed to grab a trailing line and haul himself back aboard.

Wilson, who was planning to return to Kentucky some day and marry a young lady whose name he could not remember, explained that he feared to let go of anything lest "it might get some advantage of him." For the next 12 hours, Wood took the helm.

By June 9 they were well into the Gulf Stream, with calm sea and a following breeze. The intense sun tormented them, hungry and weakened as they were. Breckinridge rationed the dwindling supply of water. Their food had been washed overboard or spoiled.

That night the wind whipped up to gale force, and seas rose to 20 feet and more. They battled simply to keep afloat and Wood gave up trying to steer. The storm abated by dawn, leaving them nearly spent from exhaustion and fear. Privately, Wood told Breckinridge that "in 19 years' experience of the sea he had never felt in so great peril."

For all their hazards, they found themselves that morning approaching Cuba. The storm that nearly killed them had, in fact, sped them on their journey. There were several sails on the horizon as daylight came, and they soon discovered themselves heading straight for the merchant ship *Neptune* out of Bangor, Maine. Desperate for food and water, they hailed her. After some discussion, the merchant captain, suspiciously eyeing the piratical-looking crew, sent down

Sergeant O'Toole is led to "Major Valdez"
at Fort Dallas (now Miami) to barter for supplies.

water and biscuits. Breckinridge ever after believed that without this gift he and his companions would have perished.

All day they sailed under a sun so hot that several of them became ill. That evening Wood sighted Double Headed Shot Keys, off the Cuban coast near Cárdenas. The Confederates hoped to make the coast by nightfall, but it was well after dark before they spotted a lighthouse and steered toward it. Breckinridge and Wood collapsed into exhausted sleep, leaving "the celebrated Colonel Wilson" at the tiller again. "That enterprising officer ran the boat nearly on the lighthouse," the general recalled, "and then concluded to wake us up for consultation." They avoided that collision, whereupon Wilson immediately ran them into a coral reef, nearly capsizing them.

At last, on the morning of June 11, 1865, Cuba was in sight. Breckinridge saw a town at the head of a bay at daylight, and steered for it. At sunrise they were in the harbor. "I am sure we all felt profoundly grateful for our deliverance," he wrote a few weeks later. After 37 days of anxiety, privation and physical torture, they were safe. Breckinridge asked Wood to read prayers before they went ashore.

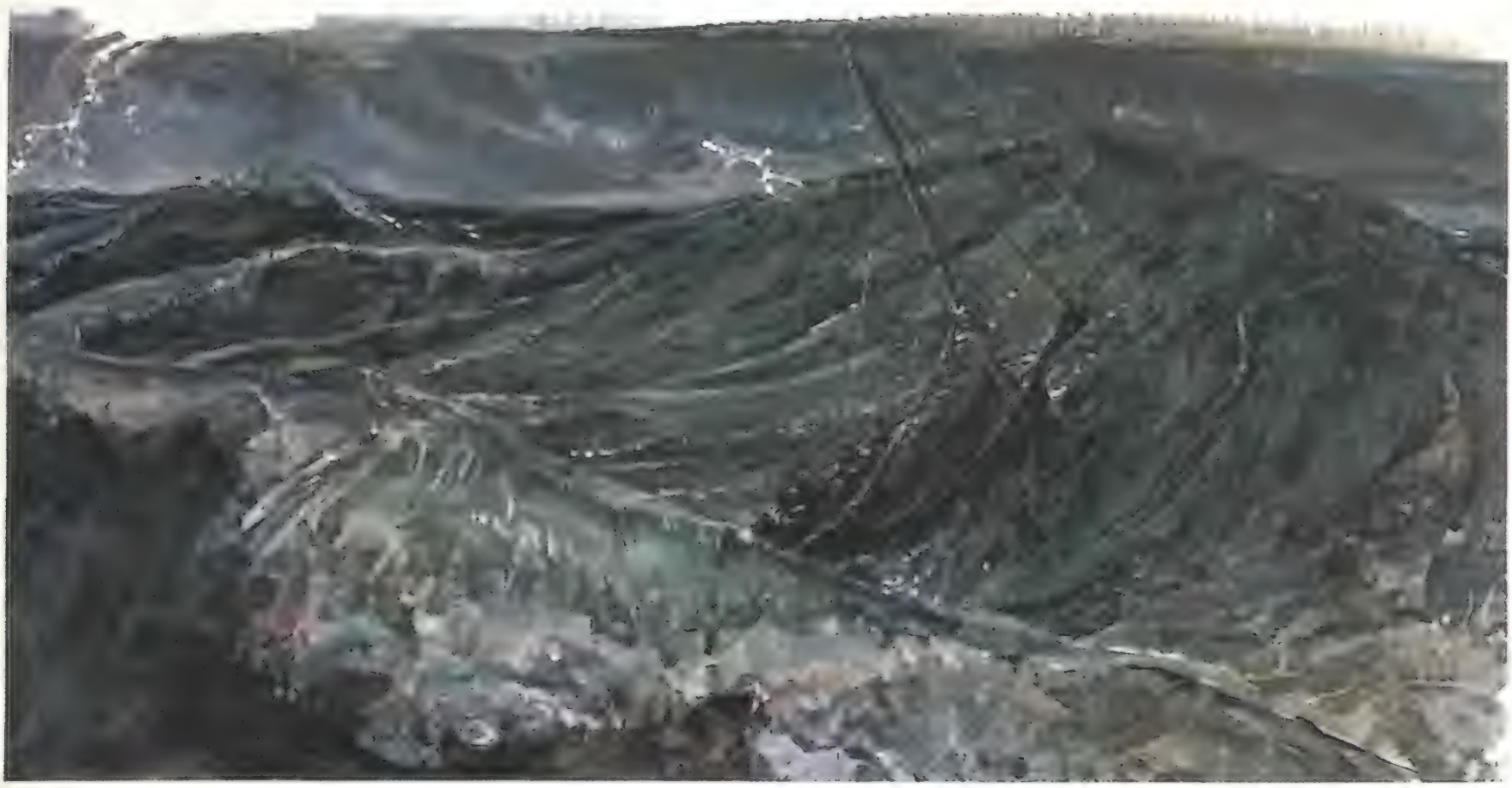
Though welcomed in Cuba as heroes, the Confederates did not remain longer than it took to recuperate from their flight. Russell and O'Toole returned to Florida, taking Tom Ferguson with them. He had been so ill during the voyage that he could not face the prospect of a trip to Europe with the general. Breckinridge gave him money for the trip.

Wood, too, soon departed, to spend the rest of his days in Halifax. And the general's old friend, the irresistible Col. James Wilson, left for Toronto. Later he would go back to Kentucky, marry the woman whose name he finally remembered and open a hotel in Henderson. He expected to do well at it, he told Breckinridge, unless his policy of charging exorbitant rates for miserable accommodations and food should provoke an irate customer into killing him.

As for John C. Breckinridge, escape—even this spectacular flight from the South—did not mean relief from anxiety. He wandered in Europe and Canada, an exile for the next three years. Always he longed to return to Kentucky, to the Union he never really wanted to leave in 1861. Finally he settled in Niagara, Canada, across the Niagara River from New York State. He could see Fort Niagara, and flying over it the Stars and Stripes. He had not wished to fight against that flag. Now he saw it "over the river which I might not cross, and there the first thing in the morning and the last thing at night I watched it, and longed for it with a hunger few men might comprehend."

He was allowed to return at last in 1869. He went home, refused all attempts to lure him once more into public life, and quietly lived out the six years that remained to him. From time to time he looked back upon his harrowing escape, never realizing that it had been one of the most daring personal adventures of the war. It had never mattered greatly to him. All that did matter was that one day he would return to his Kentucky home.

Vicious Gulf Stream gale batters the refugees on the grueling last leg of their epic escape.



Will so
please tell
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personal
r can do?

There are more people in more places doing more things with Apples than any other personal computer in the world. Most of them had never touched a computer before.

So it's more than likely that, whoever you are and whatever you do, you could use an Apple, too. Just a few possibilities:

1. Send letters at the speed of light. As opposed to the speed of the U.S. Mail.

2. Talk with the animals. Specifically, the marine animals. Dr. John Lilly is doing just that in experiments with dolphins. Any day now, they may talk back.

3. To catch a thief, and other malefactors, several police departments and FBI offices are using Apples for detective work.

4. Teach a dog to heal. Veterinarians use Apples to diagnose animal diseases and store their patients' medical histories.

5. Keep up with the Dow Joneses, summoning stock quotes and news, evaluating investment options.

6. Or train a horse. Darrell Vienna uses his Apple to keep veterinary and racing statistics for an entire stable.

7. Test your wings. Rutan Engineering uses Apples to design experimental aircraft.

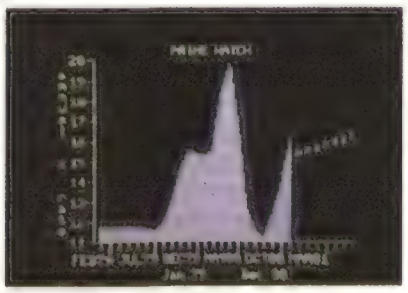
8. Or learn to fly. Cockpit simulators cost millions, but you can "fly" an Apple with a program that costs just $40.

9. Make a better impression. U.S. Lithograph does by typesetting directly from an Apple, dramatically reducing both printing costs and errors.

10. Save a life. The American Heart Association uses an Apple and a mannequin to teach CPR.

11. Calm your mind. Bendo Kagawa, a Zen priest in Japan, uses his Apple to help people meditate.

12. Or read a mind. At the University of California's Davis campus, an Apple is "teaching" ESP.

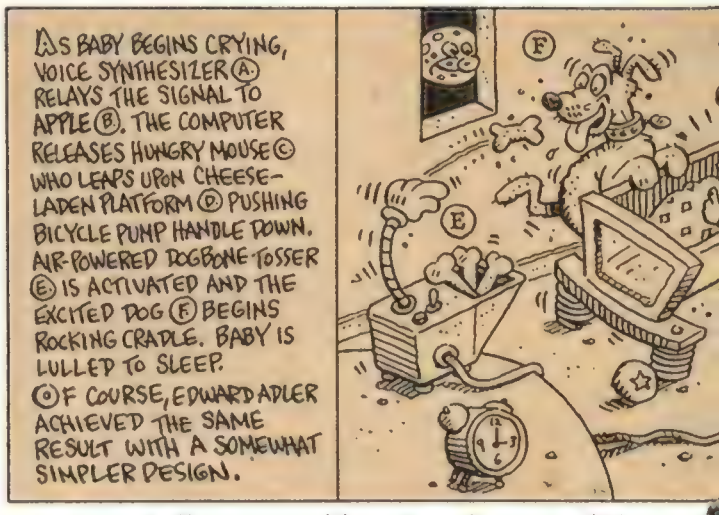


13. Draw your own conclusions. Bloomingdales uses Apple Business Graphics to see what's in store for the future. And Bell & Howell uses them to get a better picture for corporate planning.

14. Bob Waltz's Apple at Smithers-Oasis can tell you everything you ever wanted to know about growing geraniums.

15. Collaborate. Three Harvard professors writing a physiology text use their Apples to exchange chapters by phone, and report that word processing is healthier than typing and re-typing.

16. Although he never could get it to change diapers, Edward Adler rigged his Apple to rock his baby's cradle every time she cried.


AS BABY BEGINS CRYING, VOICE SYNTHESIZER (A) RELAYS THE SIGNAL TO APPLE (B). THE COMPUTER RELEASES HUNGRY MOUSE (C) WHO LEAPS UPON CHEESE-LADEN PLATFORM (D) PUSHING BICYCLE PUMP HANDLE DOWN. AIR-POWERED DOGBONE-TOSSER (E) IS ACTIVATED AND THE EXCITED DOG (F) BEGINS ROCKING CRADLE. BABY IS LULLED TO SLEEP.
(G) OF COURSE, EDWARD ADLER ACHIEVED THE SAME RESULT WITH A SOMEWHAT SIMPLER DESIGN.
A
B
C
D
E
F

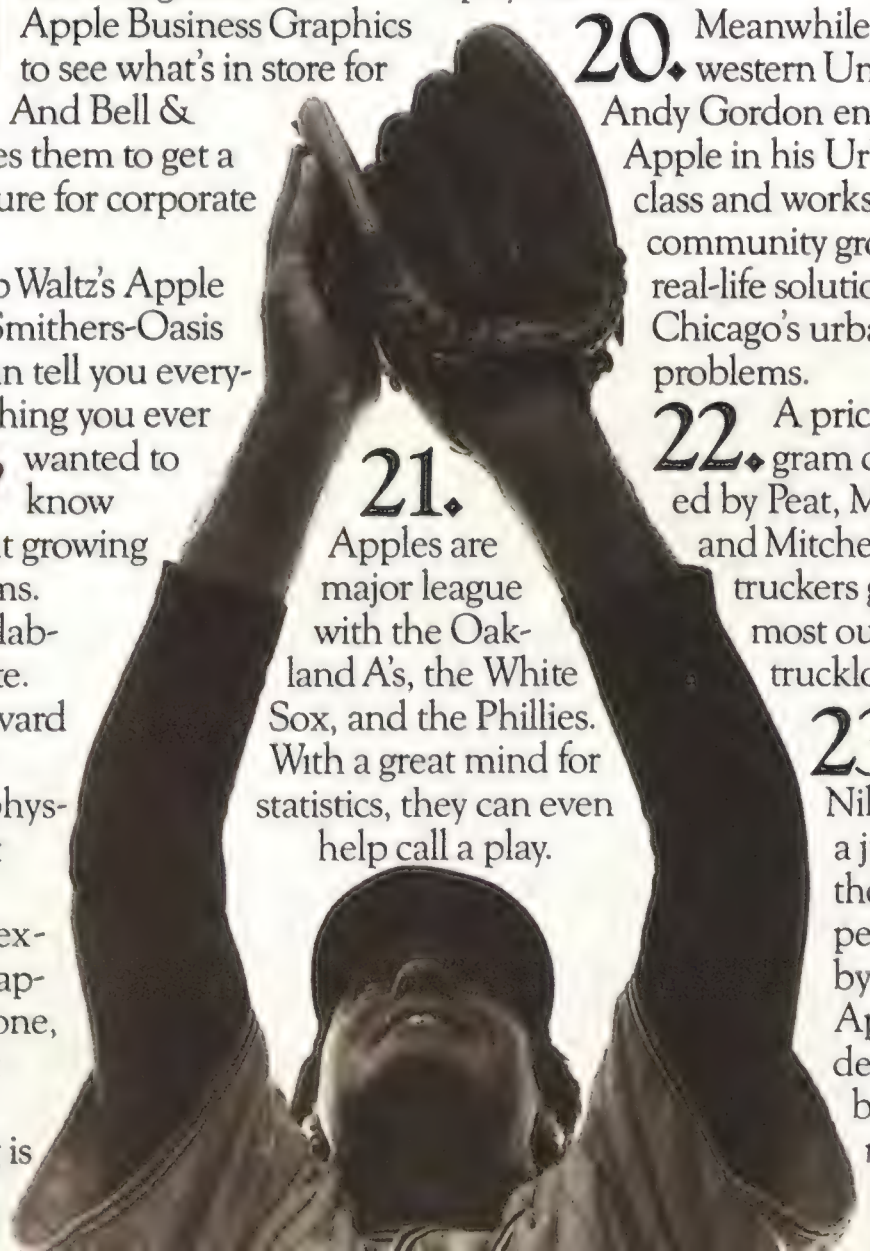
17. Apples are helping sell cars at Tom Masano Motors in Reading, PA, with cash flow and inventory programs that make lean times more liveable.

18. And they're helping fix cars at RPS Automotive in L.A. where they specialize in customizing Porsches for the unashamedly wealthy.

19. Getting physical, Steven Kamm at South Oklahoma City Junior College reports course completions up 12% after introducing an Apple to his physics classes.

20. Meanwhile, at Northwestern University, Andy Gordon enrolled an Apple in his Urban Affairs class and works with community groups to find real-life solutions for Chicago's urban problems.

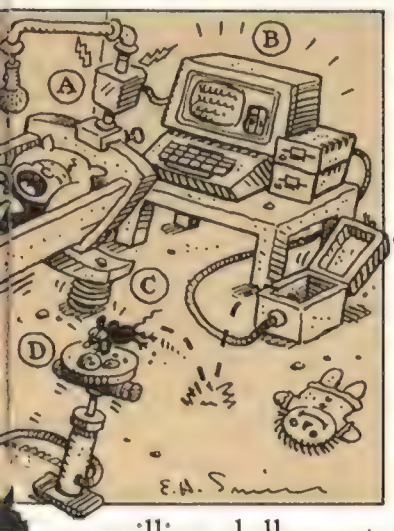
21. Apples are major league with the Oakland A's, the White Sox, and the Phillies. With a great mind for statistics, they can even help call a play.



22. A pricing program developed by Peat, Marwick and Mitchell helps truckers get the most out of a truckload.

23. Nike gets a jump on their competition by using Apples to design better running shoes.

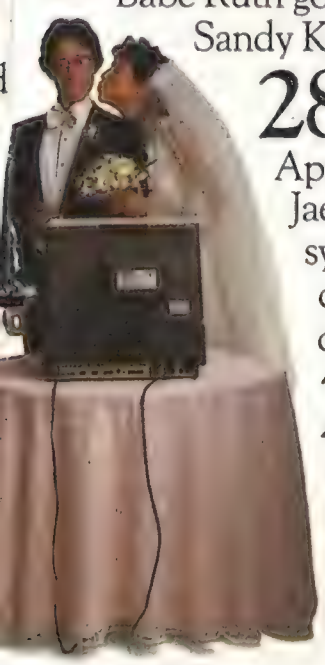
24. Contractors are getting all kinds of constructive advice from Apples, with job costing and analysis programs customized for their industry.



25. And architects can sketch new designs on Apples with the kind of programs once available only on million dollar systems.

26. When he's not working on stocks or taxes, the chairman of a major aerospace firm uses his Apple to predict the winner of the Mazatlan Regatta.

27. An Apple called every play in The Greatest Baseball Game That Never Was, broadcast by over 300 radio stations and realistically announced by Jack Buck and Lindsey Nelson. Fans who tuned in mid-inning were startled to hear Babe Ruth going to bat against Sandy Koufax.



28. You can even get hitched with an Apple. Reverend Ron Jaenisch added a voice synthesizer to his so it can perform the wedding ceremony.

29. If you'd just like to work out, several health clubs use Apples to tell you how many push-ups you owe yourself. And how many dollars you owe them.

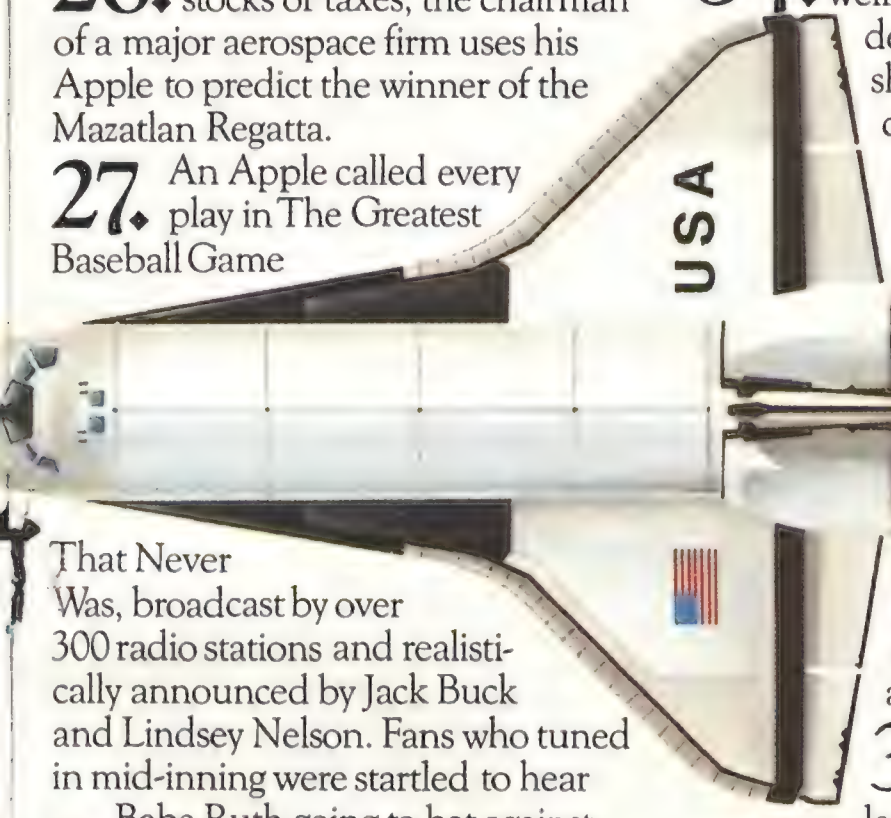
30. Getting into serious training, companies are using Apples to teach everything from photocopier repair to advanced optics.

31. Biomechanics Labs uses an Apple to figure out just how much of a marathon a runner can take, contributing hard data to sports medicine.

32. A high-flying Apple on the Space Shuttle monitored experiments on plant growth in a weightless environment.

33. While a down-to-earth Apple helped the Shuttle aim its experimental imaging radar system.

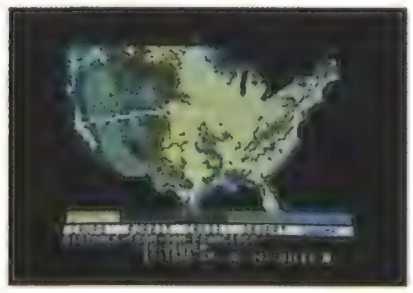
34. And yet another helps Rockwell International engineers determine how the Shuttle should be loaded to keep its center of gravity centered.



35. A psychologist is using Apple's color graphics to teach people relaxation and self-hypnosis.

36. Everybody banks on computers. But the Bank of Louisville uses Apples for more personalized service and faster approvals on loans.

37. You can make April 15th less taxing with tax preparation packages customized for several states.



38. At Checkers Pub in London, an Apple makes sure there are enough bitters, bangers and mash to go 'round.

39. At Domain Chandon, they use Apples to help pick which grape harvests will make their fine wines sparkle.

40. While at the Center for Brewing Studies, an Apple tests new beer recipes.

41. And in Washington, they're using Apples to grow hops.

42. You can perfect your pitch with an Apple, learn to read music and, that done, start writing it yourself.

43. In fact, Herbie Hancock uses one for all that jazz. It lets him use one keyboard for an incredible variety of sounds.

44. Todd Rundgren used his Apple not just for great sound, but to write another kind of hit—a program that makes spectacular color graphics easy with Apple's Graphics Tablet.

45. Earth, Wind and Fire use an Apple for fire. It sets off flash pots and explodes little bombs on stage during the rock group's pyrotechnic performances.

46. The Grateful Dead use Apples for everything from standard accounting and scheduling to controlling their sound systems.

47. And Santana's Apple has inside info on major auditoriums throughout the U.S.—stage sizes, door heights, power sources, etc.—which saves weeks of logistics work when they go on tour.

48. On a more classical note, the San Francisco Concert Orchestra uses theirs for something just as important as staying in key: keeping their books in harmony.

49. Farmers everywhere are fast-growing users of Apples, thanks to ready-to-use agribusiness programs on everything from soil fertility to hog breeding.

50. At the World's Fair in Knoxville, 35 Apples are running U.S. Commerce Dept.'s energy exhibit

with touch-sensitive video screens. So to run an Apple, just point.

51. In the oil industry, Apples are doing jobs once reserved for big computers. Like analyzing geological data and managing offshore drilling platforms.

52. Take in the trash. In Ft. Lauderdale, an Apple helps collect the garbage, scheduling pick-ups and keeping track of equipment.

53. Knit one, compute two... a German firm is using Apples to create new sweater patterns.

54. In Sun/Tronics' Home of the Future, Apples control the environment, monitor security and tell you what's for dinner.

55. William McClintic is using one to measure the performance of the new super-efficient Aeolian wind turbine.

56. Daryl Faud's Apple sifts through hundreds of bacteria strains helping in experiments with recombinant DNA.

57. If you're loyal, helpful, kind and own an Apple, you can now earn a Computer Merit Badge from the Boy Scouts of America.

58. Since tractors have to run before they can crawl, Caterpillar uses an Apple to test engines.

59. Doctors are making their practices perfect with ready-to-use Apple programs for billing, insurance and office management.

60. At St. Paul's Children's Hospital, there's one Apple for every bed in the intensive care unit, freeing nurses for more important work. Like holding hands.

61. In Tucson, Michael Lamb has adapted an Apple to automate the vital job of anesthesia monitoring in surgery.

62. Dr. Terry Pundiak taught his Apple to talk with a text-to-voice synthesizer. Appropriately, it gives anti-smoking lectures. Since Apples never smoke.

63. Other talking Apples are reading to the blind in experimental programs.

64. Apples can learn to listen, too, making life a little easier for severely handicapped people by carrying out simple voice commands.

65. Apples arrived in China shortly after Coca Cola.® A Beijing

professor uses his for laser experiments. And a Shanghai physician's helps speed diagnosis of liver cancers.

66. Dr. Michael Rumelt uses an Apple to find glaucoma patients who would most benefit from surgery.

67. Psychologist John McPhee developed an Apple program to analyze Rorschach Tests, otherwise known as inkblots. What do *you* think it means?

68. Make a dragon fly. Or a horse run. Apples make computer animation affordable. Colossal Pictures used one to create the exquisite title sequences in *The Black Stallion* and *One From The Heart.*

69. In Montreal, a weather-forecasting Apple at radio station CJAD will tell you what roads are clear of snow. Or, more importantly, which ones aren't.

70. Lose 200 pounds of ugly fat. Apple's Diet Analysis can help up to 10 family members eat smarter.

71. On the other hand, one Apple diskette can hold 500 recipes for homemade ice cream. Or anything else you've got cooking.

72. Drexel-Heritage uses an Apple to furnish the paper work that goes with making fine furniture.

73. If your credit cards are warm to the touch and ready to self-destruct, try Apple's Personal Finance Manager.

74. Improve *Life* and save *Time*. Both magazines use Apples in their national circulation departments.

75. With over 300 agents using Apples, E.F. Hutton Life custom-tailors insurance programs in minutes instead of days.

76. Most writers have trouble with anything more technical than an elevator. But many are trading their typewriters for Apples. With Apple Writer, editing is painless and the computer does all the typing.

77. Speaking of write and wrong, Apple's Goodspell will "look up" every word in a document and point out the misspelled ones.

78. Get a chip off your mind. Microelectronics engineers are using Apples for circuit design.

79. Or get in the chips by writing a hit disk. A high school student in Orinda, CA made $50,000 designing games on his Apple.

80. Speaking of games, an Apple can play more of them than any computer outside the Pentagon. So you can stage your own World Series or Super Bowl with stars whose performance is based on their career averages.

81. Or chase the Bismarck across the North Atlantic or the Graf Spee up the coast of South America in chillingly realistic strategic simulations.

82. Or match wits with the most sophisticated computer chess programs commercially available.

83. Or outwit the programmer-trolls who've created worlds of dungeons, dragons, magic spells and incantations.

84. Or play golf, poker, pool, pinball or your favorite arcade games, with far more strategic sophistication, thanks to Apple's ample memory, than any home video game.

85. Back to business, you can organize your own customer mailing list with Apple's Mail Manager. It can handle up to 5,400 names and addresses.

86. With Apple QuickFile™ software, you can store up to 200 files on a single 5¼" floppy disk and retrieve the information you want in seconds.

87. For even bigger jobs, you need ProFile,™ Apple's hard disk storage system. It can hold about 2,400 double-spaced pages or 30,000 names and addresses.

88. Learn something. More educational programs run on Apples than PBS. The top ten educational publishers are now writing courseware for Apples to compliment their textbooks.

89. Or teach something. With Apple's course design software, teachers with no prior computer experience are writing their own educational programs.

90. Or make programming child's play, even for adults. With Apple Logo,™ the first computer language designed specifically to teach programming. It's simple enough for first graders yet powerful enough for professionals.

91. Or run the whole school. Several Apples have been sent to the principal's office. To keep records and handle finances.

92. Or take the SchoolBus™ (available Spring '83), a system allowing classroom Apples to share the same program, significantly cutting costs.

93. On a different track, the Sports Car Club of America's San Francisco office now uses an Apple to keep up with race results and way ahead of paperwork.

94. An Apple helped the city of Des Moines welcome Pope John Paul during his last U.S. visit, planning being one of its cardinal virtues.

95. Assumption Church in Omaha and St. Ann's in Palo Alto, CA are just two of the growing number of churches using Apples for everything but inspiration.

96. Of course, if it's inspiration you seek, you can now read the Bible on an Apple. Not only that, but you can cross reference passages six ways to Sunday.

97. Fire departments use Apples to keep track of equipment and hydrant locations. So they can make decisions with blazing speed.

98. David Curtis of Minneapolis is a seeker of truth. So he turned his Apple into a lie-detector.

99. Some small businesses may be too small to profit from an Apple. But not Wade Harris'. He's a chimney sweep in Ellicott City, MD.

100. Floyd Berghout of Utah came up with one of the best applications yet for an Apple: understanding his 14-year-old son.

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Article and photographs by Matt Herron

The rush is on to find new gold in falling water

Small hydroelectric power stations could take the place of 45 nuclear generating plants by 2000—if governments decide to go that route

One morning in late January of 1848 in newly settled country, James Marshall, a carpenter, stood in the tailrace of a sawmill he was building for Captain John Sutter on the South Fork of the American River not far from what is now Placerville, California. Marshall was trying to puzzle out the hydraulics of a crude waterwheel he and his men had recently erected in the framework of the mill. The giant undershot wheel was developing scant power, and Marshall had fixed his attention on the flow of water along the tailrace, which had been experimentally deepened the day before and scoured by the river through the night. A scattering of bright colors caught his eye—colors that proved to be gold. Marshall's discovery, engendered by his attempts to harness the power of the river, touched off a stampede for riches unparalleled in the history of this country.

One hundred thirty-five years later, in a curious reworking of that history, a second gold rush has been unleashed by a farsighted Act of Congress. Like the California panners, today's prospectors are seeking to wring wealth from falling water. Some of them are scouring the same rivers that attracted the first placer miners to California. They are a diverse lot—ranchers, farmers, lumber companies, irrigation districts, small towns and municipalities, private entrepreneurs and consortia of small investors—all locked in a feverish competition for small hydroelectric sites. To the seekers, energy has become the Mother Lode of the '80s.

The catalyst that touched off this alchemical reac-

Penstock (long pipe on hill) leads water to California powerhouse; "rooster tail" plume occurs only during test.

Barbara and George Mallett gather family in front of their generating station; a turbine is visible inside.

tion was the passage in 1978 of the National Energy Act, a key provision of which mandated that utilities buy power from anyone who could produce it, and at rates determined by the principle of "avoided costs," that is, at what it would cost a utility to generate that power itself or purchase it from another utility (SMITHSONIAN, November 1982).

It seemed a very *American* thing to do. Individual entrepreneurs in their quest for profit, it was thought, would accomplish the nation's interests more swiftly and efficiently than could a federal bureaucracy. The Public Utilities Regulatory Policies Act (PURPA), that tributary of the Energy Act that carried the gold, required utilities—which had been in the habit of paying small power producers as little as a half cent per kilowatt hour—to pay a handsome sum, often as much as *eight* cents.

What was good for the enterprising developer could be good for the country, too. Small hydro, one of many technologies encouraged by PURPA, is often a benign energy source. It displaces oil tankers, smoke plumes and possibly acid rain. It is exceedingly durable; a well-built plant will go on producing 50 years or longer. It does not alter the shape of watersheds or back up rivers 20 miles. Mostly it churns power at existing dams or borrows a portion of a mountain stream, returning it unchanged two to four thousand feet below. It is uniquely suited to the scale of small enterprise. It thrives on the cunning of scarcity, the ingenuity of limited means; its economics perish under the attention of top-heavy bureaucracies. In its separate pieces, it is not a major resource. But taken as a whole, in combination with other renewable energy sources, small hydro can go far toward relieving this country of dependence on foreign oil. A recent study by the U.S. Army Corps of Engineers suggests that small hydro at 2,000 new sites could add 45,000 megawatts of generating capacity (the equivalent of 45 nuclear power plants) by the turn of the century.

The scramble for small-hydro sites that followed passage of PURPA took different forms in different places. In the East, hydro had been a developed resource from the middle of the 19th century until the 1930s and '40s, when economies of scale made small-generation plants unprofitable, or merely inconvenient. By the hundreds, these durable civil works were shut down. Still viable, they rusted away. Weeds grew through powerhouse walls, dams spalled, weirs crumbled, penstocks collapsed, rats nested among the windings of perfectly good generators. Now, many of these old plants are being coaxed to life. Industry had come later to the West, much of it after the large hydroelectric projects, and consequently there were few small plants standing ready for a quick refit.

Western riparian landscape presents itself in two

Based in Sausalito, California, Matt Herron has written, photographed stories for SMITHSONIAN *on oceangoing classrooms and the shapes of whales.*

general varieties, each with its own problems and its own hydro technology, a reflection of the trade-off in the physics of falling water between pressure and volume. Precipitous mountain watersheds laced with energetic, fast-falling streams lend themselves to high-head projects, to turbines that utilize the weight of water piled hundreds of feet in a penstock and released through high-pressure jets against a wheel of buckets: the impulse turbine or Pelton wheel—abundant energy from relatively little water.

The low-head landscapes, the broad valley floors crossed by massive canals carrying slow-moving volumes of irrigation water, demand a different approach. Water in volume, conveyed through a fall of 60 feet or less from a dam or reservoir, yields power with little pressure: this setup requires the Francis turbine, a chambered nautilus of gently curving vanes spinning in the base of the powerhouse.

For a small developer trying in the early days to scratch together a project, endurance was a big asset. As Barbara Mallett explained: "Building a hydro project is like eating an elephant. You have to go at it one bite at a time." She and her husband, George, proprietors of the Mom & Pop Power Company of Weaverville, California (between Redding and Eureka), recently guided the first stage of their hydro plant through a minefield of federal, state and local regulations, and brought it successfully on line.

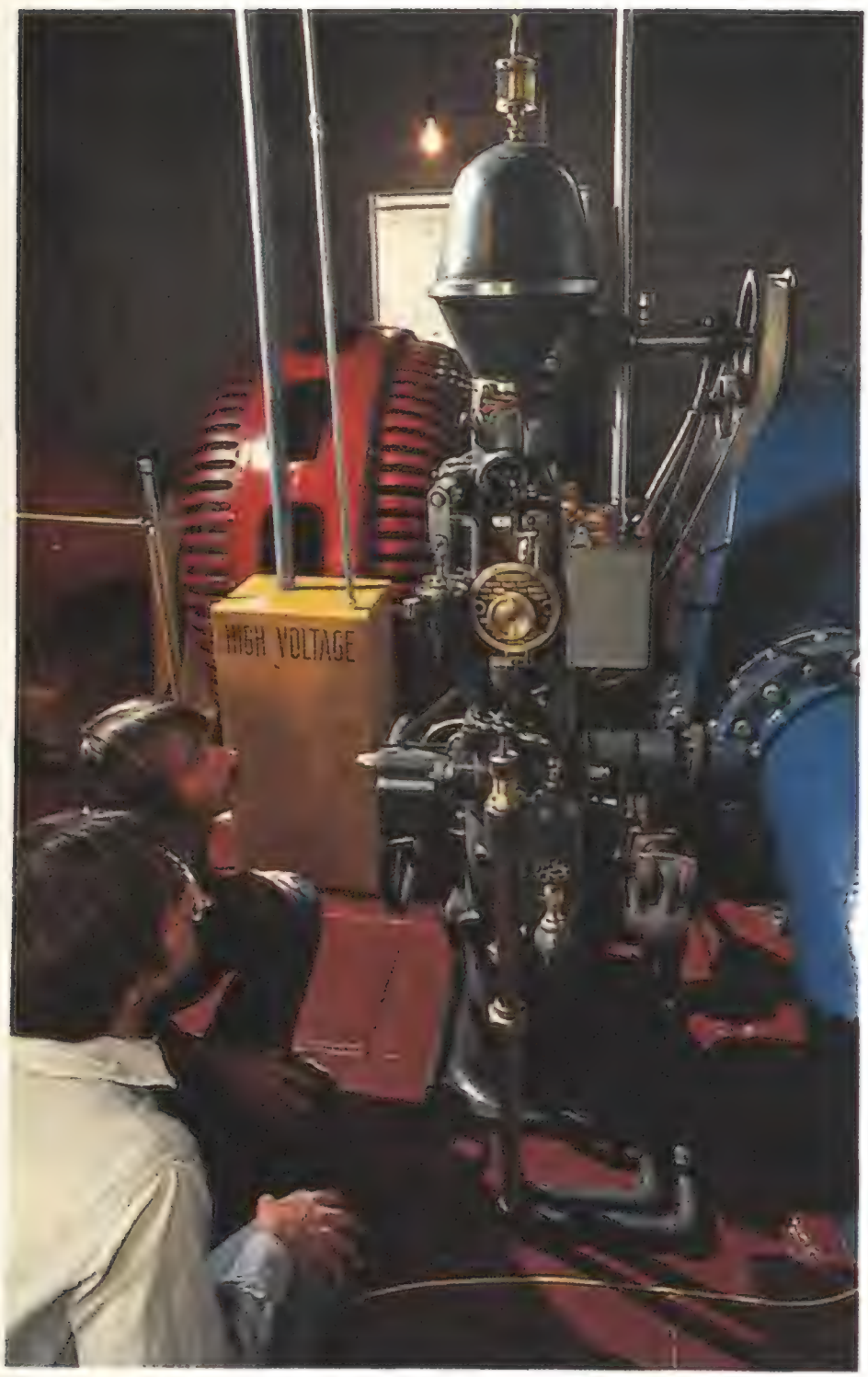
More kilowatts for the buck

The entire civil, electrical and literary works of Mom & Pop Power—the Pelton turbines, the generators, the switching and interconnection gear, the penstock, trash racks and tailrace, the engineering studies, environmental reports, regulatory permits, power contracts and associated paper by the megaream will add up to no more than $190,000 by the time the second turbine and generator go into operation this winter, bringing the plant's capacity to 600 kilowatts. Translated into dollars per kilowatt of generating capacity, a convenient yardstick often used by the industry to assess profitability, the Malletts appear somehow to have left the world of ordinary finance and learned to fly with the angels. Fifteen hundred dollars in hydro circles is considered bargain basement for a kilowatt of installed capacity; $2,000 or even $2,500, a prudent investment. Mom & Pop kilowatts, on the other hand, came home at less than $400. The figure is a little misleading, however. It does not reflect the rustic powerhouse and associated works that were already in place and churning out a steady 60 kilowatts for the resort business the Malletts bought 11 years ago in California's coastal mountains.

The Malletts decided to apply for a hydro license exemption. Consulting firms have offered that service for as much as $30,000. They managed it for $300. There were no beaten paths; everything was new, untried, experimental. They were, as Barbara put it, "always composing at the piano." So were the various bureaucracies whose approval they needed: the California Department of Fish and Game, the U.S. Fish and Wildlife Service, the Water Quality Control Board, the Office of Historic Preservation, the California Public Utilities Commission, the Pacific Gas & Electric Company (PG&E), 13 federal agencies ranged alongside the Federal Energy Regulatory Commission —and, for ultimate approval, the FERC itself. To some degree, all were unsure how to apply the new laws, how the regulations would sift out in practice, and most were elbowing for administrative turf.

PG&E claims with some justification to be—in its encouragement of conservation and the development of

Dottie Mallett, 14, broken arm and all, guides into place a section of pipe for powerhouse tailrace.



Ken Henwood (left) and mechanic Dyke Collier admire 1920 governor (apparatus in center) in powerhouse.

renewable power sources—the most enlightened utility in the country. Nevertheless, the utility had never before negotiated a contract with a private hydro producer under the PURPA laws, probably never had dealt with any project as small as the Malletts'. There were problems from the start: problems of communication (megawatts talking to miniwatts), and problems of execution (every agreement represented to PG&E a new and potentially dangerous precedent).

A major issue was the capacity contract: an agreement beyond the basic power contract to pay the Malletts extra money for that portion of their power which they could absolutely guarantee to deliver, even in a maximum drought year. PG&E charges its commercial customers more for guaranteed power, so it pays more. Bur maybe not to Mom & Pop.

The Malletts drove the 280 miles to San Francisco on three separate occasions for formal meetings with a PG&E negotiating team—in all, 12 days at the table. Eventually, the couple came to believe that PG&E would not sign a capacity contract under any conditions, and Barbara took the problem to the California Public Utilities Commission. "Of course, CPUC doesn't like to play Crusader Rabbit, but they looked at our contract and the figures seemed to be in order so they talked to PG&E. We got our contract in three days," she said.

Bill Zemke, the PG&E engineer who led the negotiating team, remembers the difficulty the utility had in adjusting its expectations, accepting a less sophisticated level of data. "It was sometimes agonizing, but we hope it ended fairly well."

Compared to eating the elephant, building the project was easy. The Malletts put up $18,000 of their own money, and found creative financing for the rest. They installed the new turbine, the generator and the switching gear, and had everything working in about a month.

Eighteen hundred applications a year

With the plant turning an annual $80,000, more or less, the payoff anticipated in under three years, the Malletts have moved on to other challenges. They do workshops and consulting. They travel and lecture. Barbara has organized a support group, the Small Power Producers Association of California, to help newcomers struggling in their footsteps, for the gold rush has created its own problems. Consider the numbers. In 1978, the year PURPA was enacted into law, 18 applications to build small hydro projects were filed in the entire country; in 1981, the figure was 18 *hundred* applications. Fully a quarter of them were filed in California where developers seemingly staked claims on nearly every rill, river and tricklet in the

"I padded across the rooftops wearing the night like a magician's black cape. And there they were. Sharing the moment, sharing each other, sharing Dubonnet. The Dubonnet Rouge, they took on the rocks with a twist and a splash. The Dubonnet Blanc, as a spritzer with soda. Dubonnet. Lighter than a cocktail, more interesting than wine. At least something is going right tonight."

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Nevada rancher Art Hall opens valve on a diversion structure that captures water for his Pelton wheel.

Ken Henwood and Robin relax outdoors. Circular machine is generator that can produce 400 kilowatts.

state. In their free-for-all competition for sites, they proposed projects on designated trout streams, on the spawning routes of migratory fish, in wilderness areas, on waters protected by the Wild and Scenic Rivers Act, on waterfalls of surpassing natural beauty. If a committee had met to consider how best to raise the hackles of every environmentalist, commercial fisherman, dry-fly fanatic and river rafter in the state, it could not have improved on reality.

Organizations that initially had welcomed small hydro as a benign counterforce to oil tankers and nuclear reactors now regrouped to fight what they perceived as a menace to the natural environment. Dick Roos-Collins, the small-hydro specialist for Friends of the River, termed it "hydromania—the worst nightmare in 30 years for river people," and published a manual for organizations wishing to intervene with the FERC in the process for granting hydro licenses. Opposition was not confined to private environmental groups; in time the state of California would take an active role.

From the regulations themselves emerged a bureaucratic Catch 22 that exposed the private developer to takeover by public bodies. A developer has three choices in staking his claim with FERC, the body that by and large controls nonfederal hydroelectric development and administers most of PURPA. He may file for a preliminary permit to study a site, a simple document which reserves it for up to three years while the developer gathers surveys and permits.

He may apply for the final hydro license, but while completing the required studies his site is vulnerable to seizure by a competitor. FERC referees such cases; best proposal wins, but among roughly equal proposals the first to file wins. A provision of the 1920 Federal Waterpower Act, however, gives unqualified preference to any qualified municipal body: a city, a flood-control or irrigation district, a state agency. Any municipality can seize the project of any developer.

From this "muni" preference there is only one shelter, the developer's third alternative. If a project is fewer than five megawatts, he may apply for an exemption from licensing, which will protect him absolutely. Such exemptions are restricted to projects that are environmentally benign, and state and federal environmental agencies have absolute authority to impose their requirements on a developer. With other forms of permits, an environmental dispute can be taken to the FERC for adjudication; with an exemption there is no appeal. Thus, if a private developer files for a preliminary permit or a license, he stands a very good chance of losing to a muni. If he files for an exemption, his project will be at the mercy, of, say, the California Department of Fish and Game, which has a strong mandate to protect fish, and none whatsoever to develop energy.

By whichever method they choose, entrepreneurs are plunging ahead. North of Truckee, California, in the heart of the Sierras, Route 89 crosses a broad alluvial plain. The road enters ponderosa pine at Graeagle: tourist cabins, some white frame houses, a filling station, the restaurant-tavern, and up a side road, the powerhouse. Cinnamon red, it sits snugged down beside Gray Eagle Creek, its 20-inch penstock running

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straight as a die and barely visible through the trees, 1,440 feet up the escarpment behind (p. 87). The Graeagle Small Hydroelectric Project, FERC License No. 3247, is the stepchild of Henwood Associates Inc., a family corporation that might also be termed, in reversal of commercial custom, "Henwood and Parents." The sons, Mark and Ken, started business in 1980 by pooling family capital and the talents of their father, Carroll. All three are engineers.

The power plant began life in 1919 supplying juice for a gold mine, and when the veins ran thin in the early '30s, was moved to its present site to power a lumber mill and the town of Graeagle. When Henwood Associates came to refurbish it two years ago, there was little to guide their reengineering of the generator and Pelton turbine. Not so the governor, which, in a synchronous generating plant, enforces the tempo of everything (p. 90). The Woodward Governor Company of Rockford, Illinois, not only stocks complete parts, but has maintained a detailed record of every replacement part and reconstruction carried out on *this particular governor* since 1920. Resplendent now in a coat of fresh paint the governor, nicknamed Fred, is a model of durable 19th-century technology—all brass and belts and spinning weights.

Wet windings and a gunshot

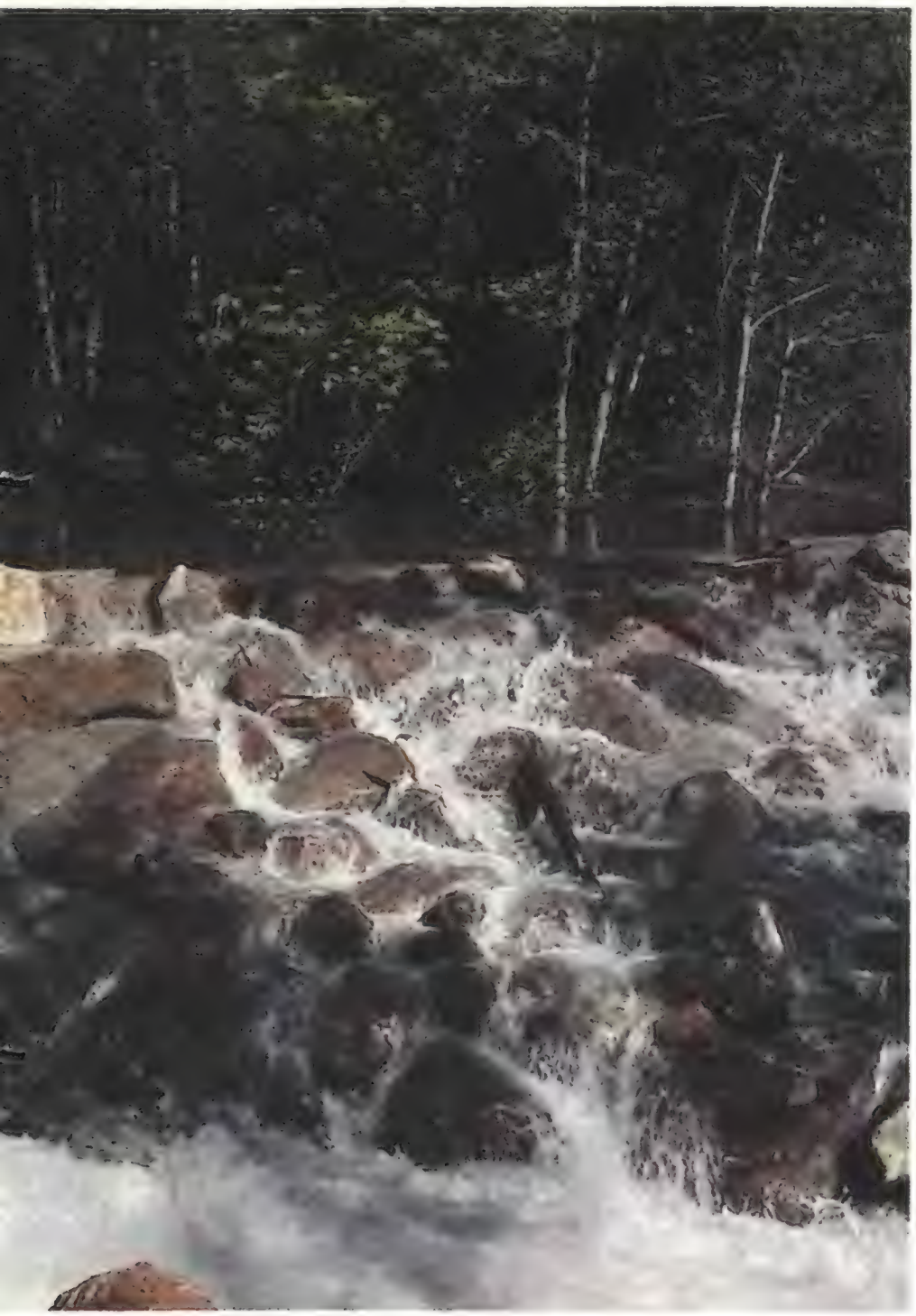
The generator had been a nesting home for rats since 1964 when utility lines reached Graeagle and the plant was shut down—it seemed for the final time. Pronounced fit for service by the Henwoods, it was shipped to Sacramento for testing, drying out and insulation repairs. Back in place by a year ago October, it sat through an unusually rainy fall, silently wicking moisture while work proceeded on the remainder of the plant.

As any hydro entrepreneur will testify, the instant when a plant is first brought to life—when the turbine turns, when the generator's coils are excited with magnetizing current—is a moment heavy with hope and apprehension.

That hour arrived for the Henwoods just one year ago. Those who had worked hardest and risked most were present when water began to flush the buckets of the turbine. A switch was closed bringing power to the coils of the generator, and its closing was greeted with a sudden, percussive crack that resounded in the enclosed space like a gunshot. Smoke appeared. Construction workers bolted for the doors. Very quickly, the generator was shut down. Examination revealed a cooked winding, the result of a short caused by wet insulation: the $20,000 gamble on old wiring and mountain dew had not paid off. But now the clock was running, with official start-up only ten days away, the

To maintain adequate streamflow, engineer Ron Ott opens sluice gate on Rock Creek diversion structure.

Chinese engineers say good-bye to their "baby" at Bailey Creek. Alexander Tseng (red tie) is U.S. agent.



Terence O'Rourke throws switch that turns falling water into electricity at Bailey Creek, California.

power contracts signed, the permits granted. Every moment off-line was revenue forsaken. Also, Graeagle's construction loan expired on December 31, and the plant had to be running to convert it to permanent financing. In seven hours, the Henwoods had torn down the one-ton monster and wrestled it onto a flatbed truck. Across the border in Portland, new windings were fabricated in a week. In Sacramento, assembly crews worked around the clock. The generator was delivered on Christmas Eve. Father and sons worked through part of the next day, and a smokeless start-up was celebrated on the 28th, three days before the money stopped.

The Chinese connection

By contrast, christening day at Bailey Creek last summer was a sunshine-and-ice-cream-suit day. American and Chinese flags flew from the flower-bedecked grandstand that sat atop the new powerhouse. Hu Dingyi, Consul General for China in San Francisco, gave the baptismal address, referring repeatedly to the anointee as "this baby hydro plant." Born in China, reared in California by Texas parents, the 670-kilowatt, seven-ton infant lay in its concrete cradle ready for immersion in the commingled waters of Rock and Bailey Creeks. The low-head Francis turbine, the generator and part of the switching gear were built by the Dongfang Electric Machinery Works of Deyang in Sichuan Province, and are the first of 35 Chinese generating units being installed in this country. China leads the world in small-hydro development with some 90,000 plants in operation.

Bailey Creek is the pride and considerable joy of Terence O'Rourke, a former environmental lawyer from Texas who is executive vice president and chief operating officer of Consolidated Hydroelectric Inc. (CHI), a subsidiary of Consolidated Petroleum Industries of Houston.

O'Rourke hired a California consulting firm, Ott Water Engineers, of Redding, which dowsed the state for likely hydro sites using topographical maps and computers as water witches. They identified 500 sites, narrowed the field to 100, and filed applications for preliminary permits on 74. Almost no sites were visited in person—the idea was to tie up all of them for study and develop the best.

Last year, it was not known whether municipalities would bother to exercise their preemptive rights over small-hydro sites in the mountains. All previous battles had centered on the more lucrative power potentials of existing dams. The answer was not long coming. Consolidated's rash of filings created a great splash, and before long copying machines were humming all over the state as municipalities duplicated

A microhydro system, hooked into drinking-water line, powers Mike Artemieff's radio, chemical toilet.

CHI permits and filed them as their own. One could hardly blame the munis for taking advantage of a law that had made sense in the '20s and '30s as a counterpoise to the avarice of private-power monopolies, but it raised O'Rourke's dander, nonetheless. "In some cases," he says, "they didn't even bother to remove our name from the permit." He hired the best Washington lawyers he could find and launched a paper war. "We were going to beat them on the rules—a tough-minded procedural thing. We lost about 14 sites but saved the rest. When I think of the thousands of public dollars they spent on those fights, though, it makes me sick."

Bailey Creek was the first site Consolidated developed—a demonstration project intended to prove that everything difficult in hydro could be done—that the requirements of state resource agencies could be met; that a profitable power contract could be negotiated with a large utility; most of all, that energy could be extracted from a stream in a way that *enhanced* the riparian environment. As with any firstborn, all care was lavished on Bailey's development. Although state regulations did not specifically require it, the fish screens specified by Fish and Game were built in elaborate detail: a quarter of a million dollars in concrete, motorized sweeping mechanisms and engineering. The streams themselves were artfully rearranged with rock-and-log check dams that created natural fish pools for spawning and rearing.

None of this was cheap. Bailey Creek cost more than $2.5 million (about $400,000 of that going for environment mitigation) but to O'Rourke it was worth it. "I'll do things for the environment I'm not required to just because I think it's right, and we'll prevail in hydro by showing people how to do it properly."

Ironically, he may not get the chance. The year 1982 was disastrous in the oil business. Consolidated Petroleum stock dropped from $12.50 to 25 cents in the oil glut, and the company has been forced to trim its payroll by 80 percent. Consequently the offspring, Consolidated Hydro, is on a tight leash, looking for investors, cutting back, fighting for its life.

In the battle over hydro and the environment, the disputants rarely talk to each other. But on a sweltering afternoon in Sacramento recently, the two groups got together for the first time. Dick Roos-Collins represented the Friends of the River, Mike Paparian was there as the Sierra Club's hydro lobbyist in Sacramento; on the other side, Terry O'Rourke, Barbara Mallett and the Henwoods together accounted for three of the five private small-hydro projects already completed in California. To the surprise of everyone, areas of agreement outnumbered areas of contention. No one in the room favored disturbing rivers of extraordinary natural value; everyone agreed the state needed some small-hydro development, and that there were rivers appropriate for it. And they identified a problem of common concern: nowhere among all the contending state agencies was there any adjudicating body whose job is to weigh environmental concerns against energy needs, and to issue balanced rulings that reflect the common good. Instead a haphazard, adversarial process has grown up, a piranha-threaded stream of regulation that threatens to devour the private developer while serving the state poorly.

But in this room at least, there seemed hope for a change. Further meetings have been held and negotiations are currently under way to resolve differences. In a similar way, the New England Rivers Center has brought environmentalists and developers together in New Hampshire, with the intention of reaching an agreement to place certain rivers of the Northeast off limits, thereby opening the others for harmonious development. It would be equally possible for events to go the other way: for governments to disagree, for the country—basking now in its temporary relief from rising oil prices—to ignore the future, for the energy promise represented by PURPA to be frittered away. And Congress will almost certainly amend the applicable laws in the next session, with unknown effects.

On the wall of Mark Henwood's office is a poster of ominous import. It pictures the Dragon, cross-legged, taking his ease against a tree. Pieces of St. George are strewn about the ground, and the Dragon is licking a last morsel from the end of a broken lance. The caption: "Sometimes the Dragon Wins."

This is a reconstruction of mill James Marshall built for John Sutter—and where Sutter found gold in 1848.

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Bell System

Front-fork spring system, lamp of 1911 Thor are "unrestored." Original-condition bike is great rarity.

Hugh Pierce, a retired pilot, putters with frame of a 1927 Henderson; restoring Hendersons is his forte.

By Dorothy Fields

Collecting antique motorcycles takes luck, elbow grease

Some much-prized models may take years to rebuild from spare parts, but enthusiasts can spot a showpiece in a pile of scrap

At any meeting of antique-motorcycle enthusiasts, both the machines and their owners are apt to appear more polished than is their usual grease-caked condition. Many of the seemingly mint-state bikes from bygone decades have been rescued from scrap heaps, found stored away in forgotten corners, or pieced together from parts collected one at a time—supplemented by custom-made replacements for missing pieces that never did turn up. In the process, most old-motorcycle fanciers find that they spend as much time on the garage floor putting their classics together, or taking them apart, as they do showing off the bikes.

A meeting, or rally, of the Classic & Antique Motorcycle Association at Lancaster, California, was just such an occasion. Old-timers and young buffs spent two days swapping parts and stories, admiring the graceful lines and engineering of the motorcycles and

Carburetor for a 1911 Indian motorcycle is stamped "Springfield, Mass.," Indian territory until 1953.

Photographs by Jack Fields

appreciating each other's skill at restoring these relics or their luck in discovering an original.

For many of the collectors, restoring the old machines is at least half the fun. One retired pilot, Hugh Pierce (pp.100-01), explained that he is happy "just making old machines run again." Another former airline employee, mechanic Bill McMenamy (pp.104-05), got so interested in old motorcycles that he quit his job to devote full time to restoration work and dealing in spare parts and accessories.

The names of the motorcycles on display evoked a golden age of manufacturing, dating back to the beginnings of motorized transportation. In such company, talk of a collector who owned a vintage Indian motorcycle—"unrestored, untouched, never been rebuilt"—produced groans of envy. Heads shook in disbelief upon hearing of such a treasure. The last Indian motorcycle rolled out of the Springfield, Massachusetts, plant in 1953, but the popularity of these bikes spans the century.

It was at the turn of the century that Carl Oscar "The Swede" Hedstrom, a bicycle racer and designer, hybridized a tandem bicycle with a French De Dion-type engine, the better to set the pace for a bicycle race. George M. Hendee, a bicycle manufacturer and track investor, saw a future for motorized bicycles, and the two apparently merged their talents by signing an on-the-spot contract on the back of an envelope.

The resulting Hendee Manufacturing Company produced the first prototype Indian in 1901. The marque (make) became firmly established in 1902 with the sale of 143 machines. The worldwide success of the bikes for the next 51 years generated such a clique of followers that as one fan put it, "Scratch any old-motorcycle rider and you'll find an Indian somewhere in his past."

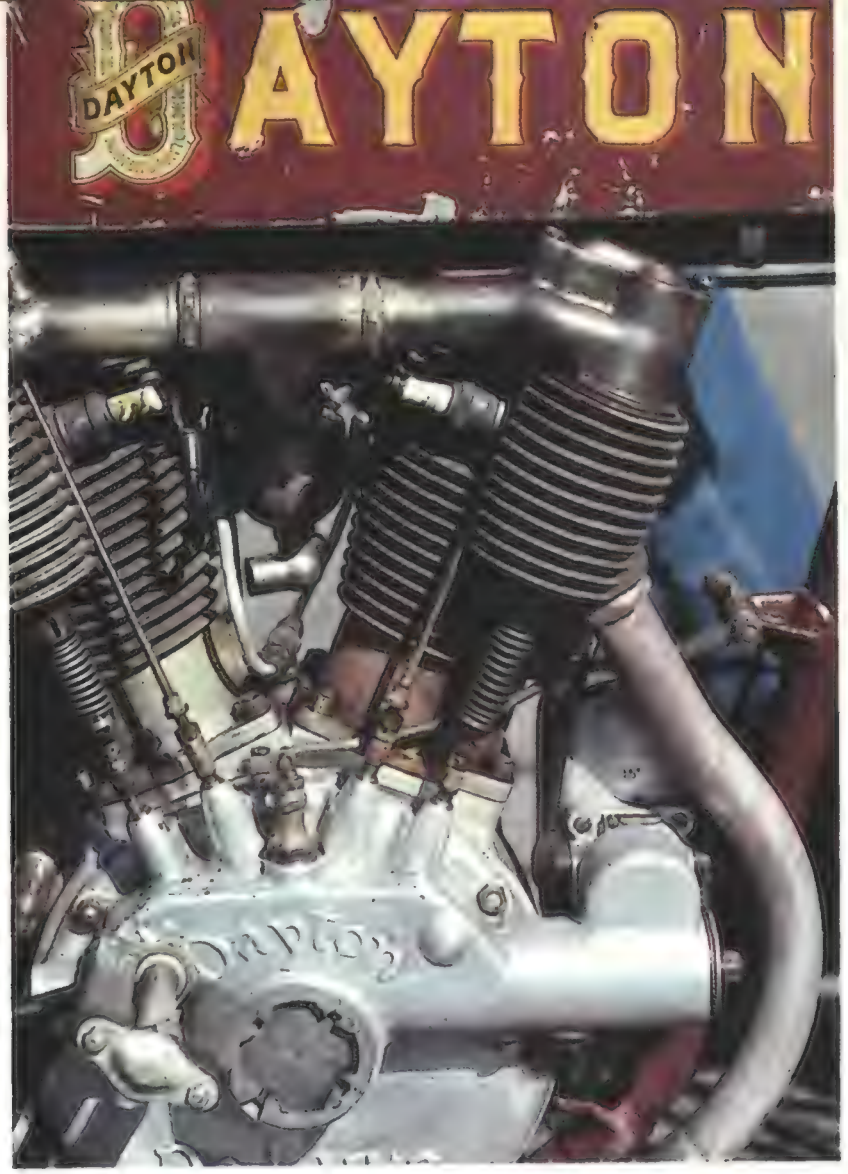
The early Indian motorcycles were propelled by engines made by the Aurora Automatic Machinery Company of Illinois, which made its own line of Thor motorcycles. It is still in business, making tools as the Thor Power Tool Company, but the motorcycles it made from 1903 to 1916 are classics.

A California collector, Willie Chambers, raised eyebrows by displaying a 1911 Thor in its original condition (p. 105), right down to the pinstriping. "This is the less expensive of the line," Chambers explained, "probably sold for $230. Now it would command $6,000. I inherited it four years ago from a very good friend whom I went to high school with, and he had inherited it from his father, who was the original

A 1910 F.N. motorcycle was a product of Belgian arms factory, the Fabrique Nationale d'Armes de Guerre.

A 1912 Dayton boasted a powerful but hard-to-work-on "V-twin" engine; many were abandoned as unfixable.

Original seat (definitely a no-frills affair by modern standards) adorns frame of a 1903 Orient motorcycle.



owner and who rode it to college in Tucson, Arizona, until 1914—that's the license that's still on it."

Antique-motorcycle collectors do not usually stop at just one or two bikes. They are often looking for "just one more." Chambers has nearly 40. Fellow Californian Bud Ekins, whose expertise as a motorcycle racer and endurance rider led him into the movies as a stunt man, owns 125. He started collecting them when he picked up a 1928 Henderson for $35 about 30 years ago. "I rode it home and kept it a lot of years. Then I sold it for $450. Five years later I bought it back for $800, then traded it for a Pope, which I still have, and the last I heard of the Henderson, the guy was asking $4,500 for it."

William G. and Thomas Henderson, brothers who turned from automaking to motorcycles, first produced their namesake cycles in 1912, the third make of four-cylinder motorcycle to be manufactured in the United States. That year a Henderson was ridden around the world, some 18,000 miles, and the marque became famous. Five years later the brothers sold the Henderson marque to the Schwinn-Excelsior Company. William Henderson then went on to design the speedy ACE in 1919, which was later merged with Indian, eventually becoming the "Indian 4."

The increase in price of Ekins' old Henderson is not unusual. Antique-motorcycle collecting and restoring can be expensive. The highest asking price for an antique bike, according to Ekins, recently hit $19,500 for a Pierce.

George N. Pierce, maker of Pierce-Arrow automobiles, had set up his son, Percy Pierce, in the motorcycle business near the parent factory in downtown Buffalo. As one of New York State's 15 competing motorcycle companies in 1909, Percy Pierce's needed something eye-catching. "Borrowing" ideas from the successful Belgian F.N., he introduced the first four-cylinder motorcycles made in the United States. The Pierce Four had a unique large tubular fuel-holding frame and shaft drive. High standards for quality and resultant manufacturing costs were reflected in the $325 price tag at a time when other bikes were priced from $175 to $250. In 1912 the tag was raised to $400, which helped nudge the company into bankruptcy the next year.

Since, according to Ekins, there are probably only 20 to 25 Pierce Four motorcycles in existence, he is happy he bought one by phone several years ago from a collector in Vancouver, Canada. "When I picked it up," he remembered, "the only part that wasn't correct was the handlebars. A week later, a fellow calls me wanting to buy one of my bikes and added that he'd

Dorothy Fields wrote on the Living National Treasures of Japan in the January 1980 issue of SMITHSONIAN.

Text continued on page 106

A 1915 Iver-Johnson, one of the last models.

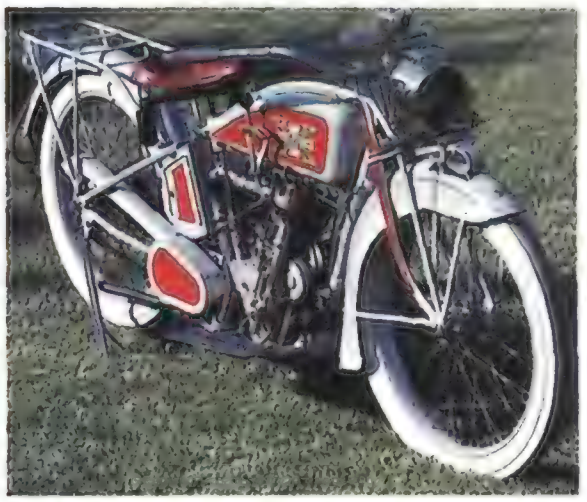
A 1902 California, unrestored.

Glittering 1902 Peugeot, a line introduced in 1899.

Bill McMenamy, collector-businessman, runs old-motorcycle shop in San Jose.

A 1926 Cleveland Fowler Four, one of about 100 made.

Rare 1919 Harley Davidsons have "flat twin" engines.



A 1915 Excelsior, by Schwinn.

A 1911 Thor (detail on p. 100).

An Indian Chief, 1948, has billowing, big-bike style.

Ner-A-Car, 1923, designed by Neracher.

"Shorty" Tompkins builds racing bike of varied parts: a Cyclone engine, Indian frame, Flying Merkel forks.

bring along a set of spare oddball handlebars he'd found. Pierce handlebars!"

Not many of Ekins' antiques were so easily reassembled: "Most were in pieces—buy a frame here, a motor there, handlebars somewhere else. Some I sat on for years and years before the right piece came along. Once you get into it, everybody knows what you've got and what you need. But you just can't be in a hurry if you're redoing an antique motorcycle. There are some things you'll take apart maybe 30 times—the same piece—and every time you put it on, you swear it's for the last time, but if it's not right—you'll go back and do it again."

Mike Parti, another collector, spoke up: "Or what's worse—you go to great effort to make a part, then an original shows up two weeks later." Parti is restoring a 1911 Excelsior from bits and pieces that Ekins had given up on years ago.

American Excelsior motorcycles were made by Ignaz Schwinn, the successful manufacturer of Schwinn bicycles, a business still operated by the family. But Schwinn also was a leading motorcycle producer, turning out single- and twin-cylinder bikes under the Excelsior marque from 1908 to 1931. In 1917 he made the Henderson brothers an offer they could not refuse for the Henderson. The name was imprinted in gold over the red Excelsior logo.

An octogenarian on the road

Excelsior Henderson restorers can still call on the expert knowledge and retentive memory of a man who was *there* when the machines were being made. Otis L. Spiker (p. 108), the last living factory troubleshooter, is still going strong at "80 plus." He rode a bus nonstop from his Mountainburg, Arkansas, home to attend the Lancaster Rally and to rap with the West Coast members of the Excelsior Henderson Restoral Society, which he runs with a chatty quarterly newsletter for the 150 members. In addition to answering inquiries from as far away as New South Wales, Norway and Sweden, he claims to spend some 14 hours a day in his shop making more than a hundred items for accurate restorations. "I can still remember the structure of those machines and I used to know all the parts by book number," he said. "Now I can't remember the numbers but I can point out what's wrong."

Today, with so many Japanese motorcycles on the road, it is hard to imagine that so many American machines were once built. But the decline began very early. With increasing public interest in automobiles and their decreasing cost, many of the original motorcycle manufacturers were forced out of business. By 1920, such marques as Apache, Arrow, Bayley-Flyer, Champion, Erie, Feilbach Limited, Flanders, Grey-

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CANDLEHOLDERS BY BUCCELLATI

Why give a collector's item that barely lights up the room, when you can give one that brightens up the holidays.

Tanqueray Gin. A singular experience.

Otis Spiker, who once worked at Excelsior factory, rests on '29 Henderson, type he helped design, build.

hound, Iver-Johnson, Hilaman, Holley, Imperial, Jefferson, Mitchell, Michaelson, Minneapolis, Monarch, New Era, Pirate, Schickel, Triumph, Wagner, Williams, Yale and others had disappeared. Only those that escaped the junk heaps emerged later as treasures for antique collectors.

Harley-Davidson is the sole surviving company in the United States still producing motorcycles. Founders William S. (Bill) Harley and Arthur Davidson of Milwaukee developed their youthful dream of motorizing bicycles into a family empire which is headed now by their descendants. In 1903, they sold the first Harley-Davidson motorcycles, soon called the "Silent Gray Fellows" for their demure paint jobs and quiet-running engines.

One collector spent $4,000 restoring a 1920 Harley-Davidson that originally sold for $130; now he "guesses" he would sell it for $12,000. Another, "Shorty" Tompkins of Sacramento (p. 106), acquired his 1928 unrestored Harley-Davidson by pure luck. It was while he was in a Lodi motorcycle shop shooting the breeze that he was invited by an old-timer to see a motorcycle stored in his barn.

"I fell in love with that thing!" Tompkins recalled. "The front end was propped up on a box—no tire—and the back tire was flat. It had 21,000 miles on it—the guy had bought it new in 1928 and the last time he'd fired it up was in 1947."

"How much money do you have to have?" Tompkins had asked, and his hopes fell when the man replied that he would never sell his bike. "But then," Tompkins continued, "he said, 'If you promise me that you will restore this motorcycle and take care of it—and you gotta promise me faithfully that you won't cut it up or make a chopper out of it, and you won't run home and sell it—if you promise me that—I'll give it to you.' "

Tompkins has kept the faith and except for replacing the tires and tuning the engine, the Harley-Davidson is just as it was when he acquired it.

Retired now after 28 years in the maintenance division of Pacific Gas & Electric, Tompkins has been racing, collecting and restoring motorcycles for more than 30 years, and he still thrills at discoveries like the "pile of rubble" he found recently among the old furniture and dusty clothes in an antique shop. He recognized the remnants of a Miami motorcycle, circa 1915, and plunked out $350 for it, much to the surprise of the antique dealer. "Most people wouldn't give $3.50 for it," Tompkins laughed.

A 1917 Indian motorcycle with sidecar exhibits classic lines that make the Indians such collector's items.

By Robert Wernick

The maligned goat may be one of Man's best friends

It has been around longer than we have —and almost everything about it is useful, right down to the milk and the mohair

National Museum, Naples

Goateed, cloven-hoofed Greek god Pan teaches young Olympus to play the pipes in a Roman sculpture.

When I told the airport taxi driver that I had come to Tucson to attend an international conference on goats, he said, "You must be kidding!" and almost drove off the road between guffaws.

There were more than 500 people—goat breeders, goat raisers, veterinarians, scholars, scientists, government officials and the curious—from 43 nations at this Third International Conference on Goat Production and Disease, and it seemed they all had similar stories.

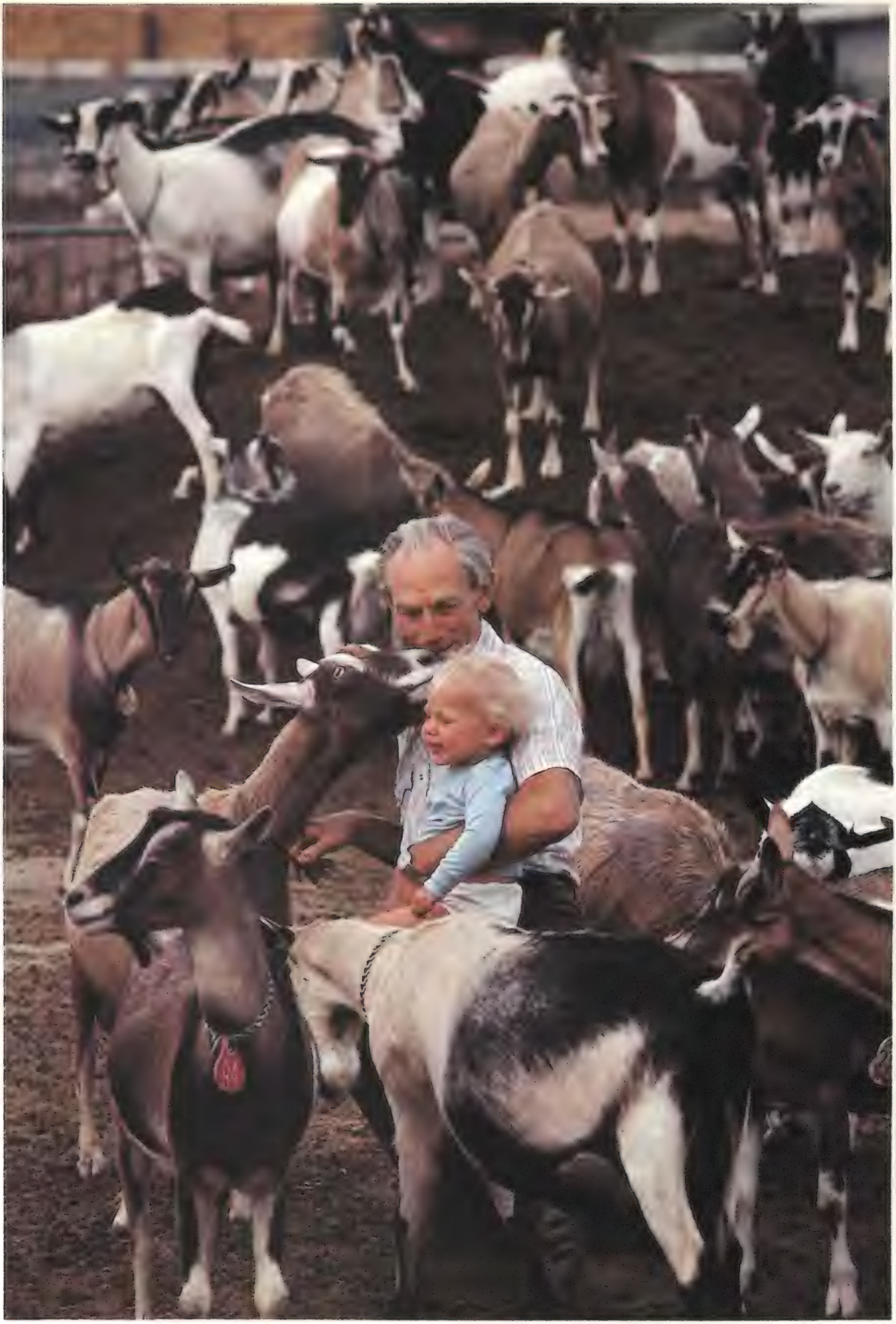
"I make a miracle vitamin-protein feed," said a Kansas City businessman, "but when I tell my distributors it's for goats, they refuse to handle it! I tell them I have checks in my pocket, their commissions are guaranteed, but they just say 'Goats!'—and laugh in my face."

This conference, hosted by the University of Arizona's College of Agriculture, was the third of its kind in history—the first was held in London in 1964 and attracted fewer than 50 participants; the next will be in Brazil in 1987. Though the meeting marked a worldwide freshening of interest in and public awareness of goats, it is still hard to be a goat enthusiast these days without carrying a chip on your shoulder. Blind prejudice, scorn, derision and hatred are still in many areas of the world the lot of this attractive, affectionate and useful little animal which has been rendering uncomplaining service to mankind for so many thousands of years.

Humankind, however, was not always so ungrateful. The goat once was considered a noble animal, a god among beasts. At the dawn of civilization, Man put great value on his long friendship with goats, remembering perhaps how goats had helped make civilization possible in the first place.

The goat has been around for a long time, emerging in the geological record five million years ago in late Pliocene times, perhaps near hilly flanks of the Caucasian and Zagros mountains. It thrived in rocky, infertile regions which in time put a premium on intelligence, agility, sure-footedness and ability to forage widely in small, self-reliant groups. Goats gradually spread out of their mountain habitat to occupy all regions of the Old World only after their domestication, an event now dated to the middle of the eighth millennium B.C. With goat herds as a reliable resource, people had new options: they could travel as pastoral nomads or live in permanent villages; in either case, they sometimes settled sparsely-vegetated areas previously unoccupied. Goats were capital goods to ancient societies, providing a steady supply of meat,

Wes Nordfelt and son visit some of family dairy herd of 900, biggest in America, near Ripon, California.



Man's good friend, the goat

University Museum, University of Pennsylvania

Ram in the Thicket, from an Ur cemetery and about 4,600 years old, is fine early example of goat in art.

milk and cheese, of skin to make clothes and containers, of hair to make tents. Together with cultivated grain and domesticated sheep, they were the basis of the first agricultural village in the Fertile Crescent; only later did cattle join the herds.

As civilization developed in Mesopotamia, the riches brought by flocks and herds were celebrated in literature and art, the realm of another conferee, anthropologist Ruth E. Smelser of Texas A. & M. Poems and pictures preserved for more than 5,000 years paid tribute to these animals, both wild and penned, and began to develop themes in mythology and religion which persist today. One of the most ancient motifs in Sumerian art is that of a buck (male) goat standing on its hind legs in the thicket, browsing on the Tree of Life, sharing its blessings with mankind (left).

As goats spread east and west from Mesopotamia, these images spread too. The gods of the Greeks, like many less important mortal babies, were nourished on goat's milk. Old Zeus, born in a Cretan cave, was brought up by the doe Amalthea; when he became king of heaven, he rewarded his nurse by placing her in the sky, turning her into the bright star Capella ("Little Goat"). Dionysus, the god of wine, was another suckled on goat's milk, and he is often shown with his retinue of goats and grapes (both of which thrive on stony soil). The nature god Pan, who some said was Dionysus' son, had goat horns and feet along with his goatee (p. 110).

The Greeks adopted many themes and astrological ideas from the Babylonians, reshaping Mideastern constellations to Greek ideas. About 400 B.C. Greek astronomers formalized the Zodiac, the circle of little animals that governed the path of the sun on its annual travels through the stars, and assigned the position controlling the winter solstice to the now familiar goat-fish Capricorn.

Offerings of goats—poor goats!

The pastoral Jews of the Old Testament found their wealth in their herds of sheep and goats. One important annual ritual from the time of Moses centered around the "scapegoat," literally the "goat escaped." Twin goats were presented as offerings in the temple and lots were cast to determine their fates. One was sacrificed in the temple as a sin offering to the Lord; the other was anointed and sent out into the wilderness (opposite, left) to be a live atonement offering.

Perhaps because the goat was so closely tied to the symbolism of the old pagan religions, when the old gods went down before the new religion of the Christians, the goat was dismissed with them. In the famous parable of the Last Judgment, Christ said that when the Son of Man came in all His glory, He would judge

Walker Art Gallery, Liverpool

Scapegoat, painted beside the Dead Sea in 1854 by William Holman Hunt, is doleful symbol of sacrifice.

Lázaro Galdiano Museum, Madrid

The *He-Goat* is symbol of the Devil in Goya painting, 1794, from a series artist did on witchcraft rituals.

all the nations of the world and separate them one from another, as a good shepherd would divide his sheep from his goats, with the sheep (those who followed Christ's teachings) on his right, and the goats (all others) on his left. Church fathers took this literally, assigning the image of the sheep to the followers of Christ, the Good Shepherd, and banishing the goat as a pagan thing. In church art of the past thousand years, all the domesticated animals—such as the ass, the sheep and the dog—are shown, but the goat, which was there in the beginning, is gone.

Indeed, during the "witch madness" of the Middle Ages in Europe, the goat was shown as one of the familiars of witches who were rumored to be practicing the old pagan religions. By gradual evolution most of the other images of the Devil have been discarded, and by the 19th century a black goat had become the symbol of evil; the Devil was shown as a dark creature with horns and a beard, a shaggy skin and cloven hoofs, looking remarkably like a buck goat (above, right).

With this load of theological opprobrium on its back, the flesh-and-blood goat was bound to suffer. Its reputation declined until, in the popular mind (that is, among people who did not keep live goats), it came to occupy a kind of cesspool. Many people still believe that goats are monstrously lecherous, odoriferous, mean, quarrelsome, dirty; that they lay waste to forests and eat tin cans. Some of these charges are unfounded, or at least highly exaggerated. But one of them is real. The female goat is odorless, but the male goat, particularly during the breeding season, is wont to urinate on itself and can easily be identified by its strong smell; for this reason bucks, when kept in confinement, are usually housed by themselves. Technology for preserving goat semen and for artificial insemination, which eliminates the need for keeping the young bucks, is being much improved and its use by producers is increasing.

The alleged mean and quarrelsome nature of goats is more often a display of curiousness and downright friendliness. Goats are remarkably affectionate animals, much desirous of the warmth of human companionship. Their bonding to human beings is remarkably strong and effective.

What probably has done the goat the most harm has been the myth about its "iron stomach." People will tell you that goats will "eat anything"; they have seen them with their own eyes "munching on tin cans." Goats do tend to investigate and often chew on a variety of things. Their main interest in a tin can, in addition to playful curiosity, is probably the glue that binds it to the label, but their digestive system, as variable as their diet might be, is not equipped to process tin cans and other inorganic objects. Goats are

The author (who likes but does not love goats) lives in Georgia and Paris; he wrote about American artist Milton Avery in October 1982.

finicky eaters and typically will refuse unclean hay, grain and water. Still, they can find adequate food where most other animals cannot. For example, as you travel in countries such as Pakistan from more hospitable areas to drier, higher and rougher terrain, the cattle are the first to disappear and then the sheep, leaving the camel and the goat and, finally, just the goat. At the same time, in the mountains high above, the wild goat or the Sind ibex and the Markhor (below and opposite) are the lone ungulate occupants. Geneticists are now sure that the domestic American dairy goat is descended from the wild goat (of which the Markhor is one example) that still roams parts of Asia, Europe and Africa.

And so the goat also inherits from its Pliocene past the potential to adapt to a diet high in fibers of low digestibility that cattle and sheep are less fit to make use of, to harvest otherwise wasted feed from range and wasteland where most other animals cannot survive, and to convert it into high-quality food for Man.

This has meant that goats can be kept on land that does not have materials suitable to support other species of livestock. And that in turn has meant that goats have come to be associated with poor people, marginal land, pockets of poverty. "The poor man's cow," the goat is called in some countries, and it has managed as well to acquire an undeserved reputation for being slovenly by nature.

Because goats can survive under conditions unsuitable for other livestock classes, goats are often found in areas where the last stages of erosion and decay have been reached. Goats then become the culprits. A speaker at the Arizona conference told of once meeting a director of animal husbandry in Pakistan who announced out of the blue: "The decline of the Muslim Empire can be blamed on the goat."

Foresters are apt to grow apoplectic when they speak

These goats browsing in Upper Volta may contribute to desertification, but goats are not always to blame.

Domestic goats are descended from wild ones like this flare-horned Markhor, sought as trophy by hunters.

about goats, and they have a certain point if the goats are not well managed: with their tendency to browse, goats can be hard on small, young trees and ruin reforestation programs—their bipedal stance (left) gives them greater access to low branches. But so do deer and other animals browse, and it is absurd to blame goats for all the world's erosion and desertification.

"The goat is destructive because of its ability to survive and the conditions under which it is placed," says Warren C. Foote, conference co-chairman and director of Utah State University's International Sheep and Goat Institute, adding that "the burden of responsibility for the damage should be borne by he who controls or manages the goats—not the goats." The mighty trees that once grew all around the Mediterranean and through the Middle East were not nibbled down by goats; they were chopped down over the centuries by men building temples, palaces or ships, or simply in need of firewood or wanting to make charcoal.

A world of difference between cousins

Goats and sheep might be considered cousins; they belong to the same "tribe" and there is a difference of only six in the number of chromosomes between domestic sheep and goats. If you think goats have short hair, and sheep have long fleece, then the Angora goats, which produce mohair, and the hair sheep, which have no wool, are bound to confuse you. A useful rule of thumb is that sheep's tails hang down while goats' tails stand up; another is that buck goats typically have beards. While the size and skeletal structure of these cousins often appear to be similar, their behavior could hardly be more unlike.

Sheep are conformists; goats are unpredictable, flighty, capricious—the word comes from the Latin *capra*, meaning goat. "Capricious, but not lunatic," one prominent French goat breeder says. Sheep, with their heads usually down, are in general quite unaware of and uninterested in the external world. If a sheep hears a low-flying plane, for example, it will become frightened and is likely to run, whereas the goat will often stand and watch.

Despite their friskiness and unpredictability, goats are basically down-to-earth creatures, with a genius for making the best out of any situation they may find themselves in. And centuries of cohabitation with mankind have put them in all kinds of situations; they have learned how to survive them all. These rugged individualists have produced breeds which can live through the fearful winters of the central Asian highlands and grow a downy undercoat which makes cashmere, finest of fabrics; they have produced breeds, small or dwarf in size (p. 119) and ungainly, but lively and productive, which can live in the tropical coast-

Another fully-grown male Markhor has characteristic spiral horns. This one comes from Afghanistan.

Near Ladakh, Kashmir, a herd of goats, destined for the table, is cajoled through a mountain pass.

lands of Africa where sleeping sickness prevails. They thrive in the deserts of the Negev or in green Alpine pastures. Shipwrecked, they have colonized desert islands. In the days of sail they went on ocean voyages to provide fresh milk for the passengers; Columbus had a small herd with him on his second voyage, and millions of their scraggly descendants are still prowling the wastelands of Latin America.

The United Nations Food and Agriculture Organization estimates that there are nearly 469 million goats in the world today. Some delegates at the Tucson conference suggest that the real figure may be even higher. Goats are prolific animals but, according to Christian Gall, of the University of Hohenheim in Stuttgart, exact censuses of goats are seldom carried out; if they are, he says, goats "are not lined up for counting and, since there are many reasons for keeping one's goat numbers down, you may hide away half of your goats" when the census taker pays a call.

Goats indeed have a bent for anonymity, as you may realize if you ask yourself when was the last time that you actually saw one. Cows, sheep, horses all impose themselves on the landscape—you can usually see them from way off. But goats tend to fit themselves into the landscape's folds and crannies, and they like steep, inaccessible places; it is easy to miss them.

For a while it appeared as if the world goat population would decrease. In the advanced industrial nations, as rural incomes supported fewer people, many flocked to the cities. The marginal lands—hill country, scrub country, goat country—"Billygoat Acres," as it has been called in parts of the South—were abandoned, and the goat population of countries like England, Holland and Germany fell perilously close to zero. Only where there is a tradition and taste for caprine products—as in France, where they make some 70 different kinds of goat cheese—did numerous herds survive, but there, too, they were shrinking.

In the nonindustrial nations the shrinkage was often taking a dramatic form. The elites of those lands, pursuing their studies in Europe where food was usually abundant, acquired Continental prejudices against the goat. They came to regard the animal as a symbol and cause of their own countries' backwardness. In some cases this became a political issue. Certain governments passed laws severely curtailing goat production, others embarked on programs of wholesale eradication; few if any of these attempts were effective

in controlling or reducing the goat populations.

Much is changing now that we are in the midst of what appears to be a "goat renaissance." The talk these days is of how the goat combats hunger and provides, on a daily basis, the essentials of life for the family that cares for it. A goat might produce only a few ounces of milk a day, but this nutrition-rich food may provide, for example, a minimum requirement for a child, or children, to continue to grow and function mentally and physically in a near-normal manner. Many individuals who cannot tolerate cow's milk—in particular, infants, invalids, the sick and elderly—relish and thrive on goat's milk.

The goat spreads many other products throughout the world: cashmere, mohair; glacé kid, kid gloves; bookbindings; the *chèvre* cheese now appearing in American supermarkets; the *cajetas,* or Mexican caramel candies with a goat's-milk base; meat served up at barbecues or ground into sausages and hamburgers.

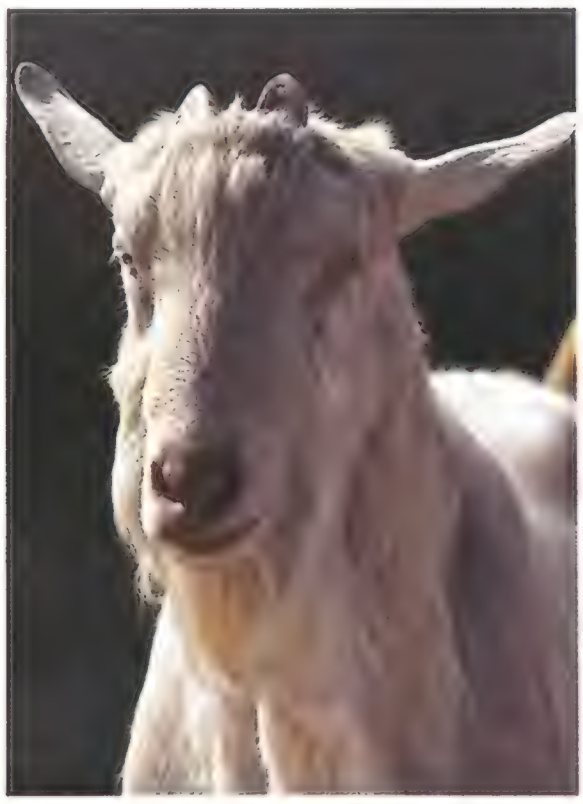
In the developing countries, national and international programs are now aimed at increasing the productivity of goats, improving the local breeds, introducing dual-purpose goats where the animal previously had been raised only for meat (or not at all). All of these plans are well intentioned, and some work. Those that do, says one expert in Africa, are the simple ones. Complex and superficially attractive schemes hatched in laboratories and government offices are likely to founder on the facts of life in tradition-bound societies without an infrastructure of technicians and veterinarians. It is much cheaper and much more effective to establish production capabilities of native goats in the traditional environment and to base future improvement of herds on these.

Although goats have adapted to many different environments, they appear in largest numbers in tropical and subtropical areas, where the environment is varied and often unpredictable. In semiarid regions like northeastern Brazil, where droughts are common, goats have unique advantages over other livestock species. In severe or prolonged drought their numbers can be drastically reduced and, when feed again becomes available, rapidly increased because of their immediate response to improved conditions and their remarkable reproductive capability.

Industrial nations, too, are making friends with the goat again. Recent Department of Agriculture livestock-census figures, conservative at best, show an estimated 1.8 million commercial goats in the United States. Most, like the Texas Angoras, produce mohair, but some dairy-goat farms (p. 111), have sprung up too. The majority are small-scale units, but that to many is one great charm of goat raising: it is always a modest but labor-intensive enterprise.

In these days when agriculture is becoming more and more industrialized, when it costs a small fortune in capital investment to get into the cattle or fruit business, goat raising is a logical possibility for a small family farm. It is a small enough production unit and flexible enough in its feed-and-management requirements to be affordable to most families; it can also provide poorer families with a little cash income that

Roman nose, large and droopy ears identify Nubian, an African goat.



"Prick-eared" Saanen is one of two most important Swiss breeds.

Alpine buck, reared in California, is top sire in its productive dairy herd.

On Nordfelt farm, a visitor finds an Alpine goat, true to form, curiously nibbling a shirt-sleeve.

can contribute to their survival. Goats can be bred before their first birthday; they reproduce faster than cows and often produce twins, sometimes even triplets.

Old prejudices fall away hard, but people who may never have owned goats before may start to, as they perceive how useful this animal can become. In the trend-setting circles of California, goats have been kept as household pets recently by celebrities such as Robin Williams and Lily Tomlin. The town of Hartsville, Alabama, found it could cut its utilities-department budget considerably last year by using a herd of goats to "mow" a large area of grass surrounding a water-storage tower. Tests and long experience in Texas have shown sheep and cattle farmers that raising goats along with the other animals will keep the range in better shape. Even foresters are intrigued by the ability of Spanish or meat-type goats to keep firebreaks cropped at much less cost than when bulldozers and chemicals are used.

In Michigan, where many people are turning to homesteading, they are finding that having a few goats can be a big help in reducing the amount spent on store-bought milk and dairy products. It would be an even bigger help, they say, if they could find a steady market for the milk and cheese their goats produce, and the meat of the kids they slaughter. But few commercial channels for the processing and distribution of goat products exist there.

The same is true in several other states, although many people feel that there is a substantial untapped market for such products in America. Under ideal dairy-production conditions, it is difficult to discern the difference between goat's and cow's milk. Kid's meat, too, is just as tender and delicious as lamb (Tuskegee Institute, in Alabama, is currently evaluating the goat as a potential meat animal). Goat cheese is considered a gourmet's delight, although some of the imported brands do have a characteristic taste which is not appreciated by everyone.

As more and more people move into rural areas, whether to escape the discontents of city life or just to relate more closely to the good things of nature, the goat is a natural inclusion. Some, quite practical, see goat raising as a challenging, food-producing vocation. Still others may keep goats simply because they like them. Then there are the more historically-minded ones—like those representing so many walks of life at the Tucson conference—who take the longer view, and see this friendly little animal resuming the place of honor it occupied millennia ago.

In western Washington, a Pygmy goat perches atop a shed. This species may have originated in Africa.

Nuns in Vatican laboratory work on the celebrated Raphael tapestry, *Miraculous Draught of Fishes.*

By Dora Jane Hamblin

Great art treasures of the Vatican are getting spruced up for a visit

When many newly restored masterpieces of the Papal collection go on view here, we will see them in all their original glory

In 1983 millions of Americans in New York, Chicago and San Francisco will get to see a selection of 237 precious items from the Vatican art collection.

No doubt several hundred thousands have already seen some of the objects, on tours of the sprawling Vatican museums in Rome, but "The Vatican Collections: The Papacy and Art" exhibition is the first collection ever to go abroad. As such it is an unprecedented opportunity to enjoy an uncluttered study of the range of materials and art forms, as well as the span of more than 20 centuries, in one of the world's great eclectic art troves.

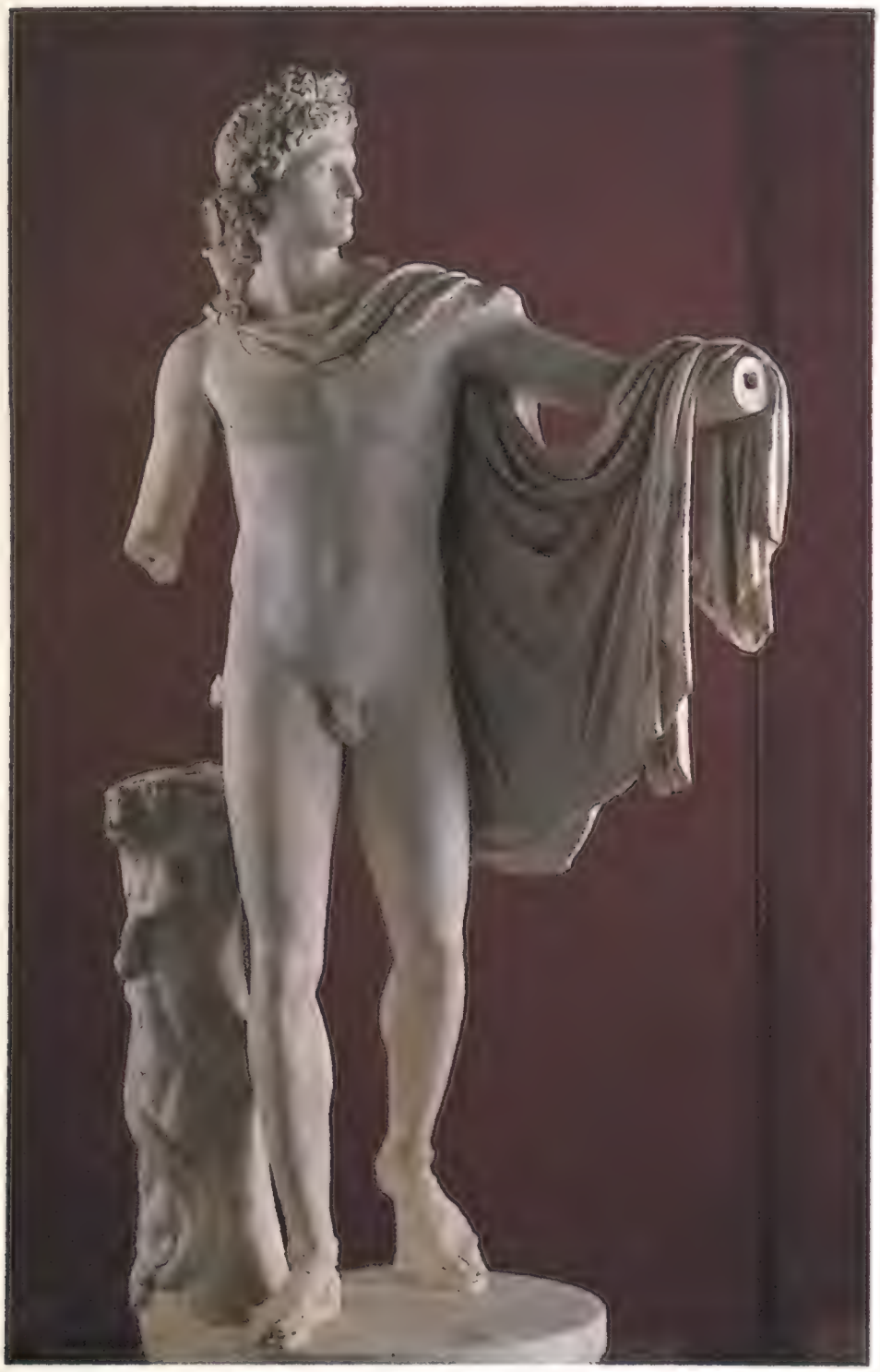
A centerpiece, and one of the best loved of all the items on view, will be the slim and graceful marble Apollo Belvedere (p.122),which the late critic Bernard Berenson described as "a symbol of all that is young and free, strong and gracious. . . ." Apollo has stood for four centuries firmly fastened to the wall of a niche in the Octagonal Court, once the garden of the Belvedere Palace built on a hill near St. Peter's by Pope Innocent VIII. Apollo was taken prisoner of war by Napoleon and kept in Paris from 1798 to 1816, but apart from that interlude he, like most other items in the show, has never before left the hallowed precincts of the Vatican once he was placed there. And he may never leave again.

The vicissitudes of Apollo

Apollo is a uniquely worthy symbol of the entire exhibition, for many reasons. He was the very first piece of art installed in a "sculpture garden" designed for Pope Julius II in 1503, which became the nucleus of all Papal art collections and the genesis of a museum complex which now spans seven kilometers of exhibition wall and gallery. More important than this pride of time and place, however, is his story since 1503. He has been admired, copied, altered, "restored," and, most important, preserved through centuries of change in taste and knowledge. His is the story of virtually all the specific objects of beauty and antiquity which have come to rest in the museums and the hearts of the 20th century, and his is the story of the vicissitudes they suffered en route.

Apollo is a Roman copy of a Greek bronze made probably by Leochares about 330 B.C. That original likely stood somewhere in the Agora of Athens, but it is lost. The marble copy was made by an unknown sculptor in the Imperial Roman period A.D. 130-40. It is believed to have been found in the 15th century in Grottaferrata, near the outskirts of modern Rome, and was acquired by Cardinal Giuliano della Rovere, an antiquities lover who installed it in his titular Roman church, San Pietro in Vincoli. When he became Pope Julius II in 1503, he had it moved to the Vatican. It

Photographs by Dmitri Kessel



Apollo Belvedere, a Roman copy of a Greek bronze, was the first item in today's vast Vatican museums.

was lacking a left hand, about half of the right arm, and whatever items it once held in each. Restorers and art historians believe the left hand must once have held a tall bow, the right an arrow. The quiver and an elegant thrown-back cloak are still in place.

By 1531 Clement VII was Pope, and he was a man who preferred his ancient statues rendered whole again. Michelangelo recommended one of his assistants, Giovanni Angelo Montorsoli, for the job. Montorsoli made a new right forearm and left hand for Apollo, and also raised the height of the marble tree trunk which helped support the figure.

It was not Montorsoli, however, who applied the fig leaf which Apollo wore for several centuries. Montorsoli left him as God and the original sculptor had made him. Nobody knows for sure when the offending leaf was applied, but it may well have been during the reign of Pope Paul IV (1555-59), a stern Theatine monk who also ordered Daniele da Volterra to paint loin cloths and draperies over many of the nude figures in Michelangelo's *Last Judgment* in the Sistine Chapel. Michelangelo grumbled to the architect Giorgio Vasari that the Pope would do better to change the people instead of the paintings.

Bemoaning the great cover-up

That was not the mood of the day, however. A latent Christian suspicion of all things heathen flared up anew and fig leaves were applied right and left, to Laocoön and his sons, to the huge Belvedere torso, to statues of Mercury, Achilles, Marsyas—even to the bevy of demure marble maidens whose sexuality was far more subtle than that of the males. When the great German archaeologist and art historian Johann Joachim Winckelmann was appointed the Vatican's Commissioner of Roman Antiquities in 1764, he took one look at the array of "decent" fig leaves and remarked sadly, "A little more and they'd have castrated them, as in the harem of the Grand Turk."

With or without fig leaf, however, Apollo was studied by painters, sculptors, anatomists and covetous monarchs from all over Europe. Albrecht Dürer made a series of drawings of him; François I ordered a bronze copy for Fontainebleau (it is now in the Louvre); and small copies or imitations are in other collections.

By 1924 a more modern concept of restoration had taken over the art world. Vatican technicians carefully removed the left hand and right forearm, added by Montorsoli. They also repaired the back, the legs and the feet to correct damage caused by rust from the iron bars earlier restorers had inserted between Apollo's shoulder blades to help affix him to the niche.

But they did not remove the fig leaf. That final restoration came in 1981 in preparation for Apollo's

flight to the United States as part of the traveling show. Some of the complicated arrangements for transport included a promise that the three U.S. museums—New York's Metropolitan, which has primary responsibility (February 26 to June 12), Chicago's Art Institute (July 21 to October 16), San Francisco's M. H. de Young (November 19 to February 19, 1984)—would pay for whatever restoration was needed to each of the selected items so they could better tolerate the journey and look their best once they got there. No party to the arrangement is willing to discuss specific sums of money, but there has been such a flurry of expansion, reorganization and addition of new equipment in all the Vatican's restoration laboratories that it must have been considerable.

Apollo was removed from his niche and a precise plaster copy set in place for the tourists while he travels. A four-man team of white-coated marble experts supervised his careful transfer to their laboratory, and work began under the direction of Ulderico Grispigni, a deceptively youthful-looking man who has been at his trade since 1950 when he went to work as a 15-year-old apprentice. Apollo looked pretty good himself, for his age, though he was stained with dirt and smog and discolored here and there with rust stains. Both his marble ankles were fractured, and his entire body tipped out of line by five centimeters. Only the iron rod between his shoulders had been keeping him upright. There were little fissures in the marble from earlier insertion of copper pins and supporting iron rods. The plaster that held them had expanded with dampness and was splitting the marble.

The first item of business was to make radiographs of the whole statue to search for hidden fractures. Next, Apollo was literally taken apart at every joint or fracture where he had been mended before. It quickly became obvious that the ankle fractures were caused by faulty inner supports that had tipped the figure out of true. When they were removed and new stainless-steel bars inserted, the fracture lines in the ankles fitted perfectly. Grispigni and his crew were careful to use old borings in the marble to fit their new supports, though in some cases they had to grind a bit further to insure a good purchase. Every time they did, they lovingly collected each heap of marble dust and put it aside. That dust, mixed with a clear polyester resin which will not discolor, was used to glue the ankles back on and to cover the mends. The color and the marble dust match so perfectly that the lines are invisible to the naked eye. The back brace was removed entirely and—*voilà!*—Apollo could stand on his

Dora Jane Hamblin, an Iowan who lives in Italy, wrote about the 400th birthday and history of the Uffizi Gallery in last month's SMITHSONIAN.

Back of Apollo Belvedere is visible for first time in centuries; he had been fastened to a wall.

Apollo's left foot shows no sign of masterful 1981 restoration required because of inept early attempts.

Carefully restored Etruscan piece, called an antefix, came from end of tile eave on an ancient temple.

Bernini's 17th-century terra-cotta was study for Charity figure on tomb of Urban VIII in St. Peter's.

own two feet again, proudly and securely. In his free-standing state he can be viewed in the round for the first time in 400 years, so U.S. museumgoers will get a full view of his manly self.

Laying hands on the statue, which has become virtually the symbol of the Vatican museums, might have daunted even a Grispigni had he not faced an even more terrifying task ten years ago. That one was to repair Michelangelo's *Pietà* which a deranged Hungarian-born Australian named Laszlo Toth had attacked with a hammer inside St. Peter's. The *Pietà* was too precious even to be moved to the restoration laboratory, so the crew repaired it in situ and developed the technique of mixing powdered fragments of the native marble with resin to glue back the large pieces and mend the tiny chips. It took ten months, but the experience has paid off ever since.

It also helped prove that in the welter of chemical substances, mysterious potions and magic machines, every now and then an ingenious homemade recipe will do the trick. In the case of the *Pietà*, restorers were plagued for weeks by ugly dark stains left on the figure of the Madonna. They examined them, analyzed them, refrained from touching them until somebody suggested what Italians call *strappa*, a lifting or pulling. Cautiously they applied ordinary Scotch tape to the black stains, and cautiously they pulled it off again. Lo and behold, the stain proved to be nothing but traces of an antirust material on the brand-new hammer Toth had used in his attack, and was "lifted" slowly with Scotch tape with no damage to the marble.

Similarly, Apollo could be cleaned of his coating of

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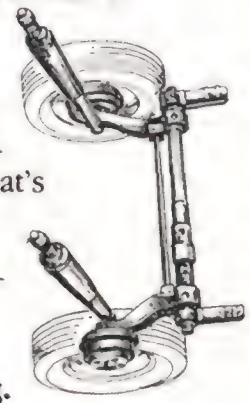

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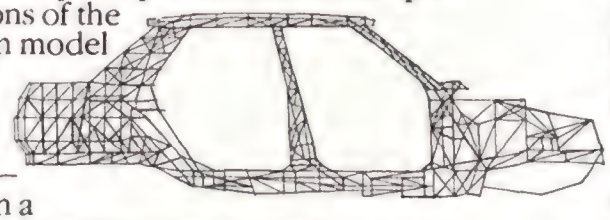

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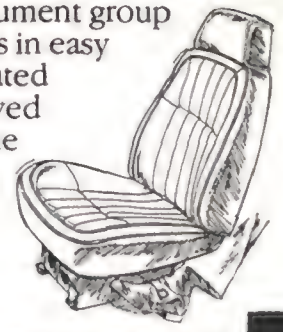

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Heroic statue of Hadrian favorite, Antinoüs, second century A.D., received new braces, minor repairs.

One of the Vatican's most noted pieces, bronze boy from Tarquinia, is cleaned in the Etruscan laboratory.

dirt and smog with a plain old shower bath. "Just water, Roman tap water," said one of the technicians, brandishing a shower head and pulling off the canvas cover of a deep shower stall where Apollo had stood for a few hours having a good cleanup. His final treatment was application of a U.S.-made polymer solution called Paraloid B72, which is a sealant.

Somehow, the aura of the Vatican itself, the age of many of its treasures, the fact that it has had "restorers" at least since 1532 when Montorsoli worked on Apollo, leads one to expect murky workrooms full of doddering old men, priests perhaps, surrounded by heavy tomes and powerful microscopes. Not at all. The official establishment of a series of restoration laboratories—for paintings, marbles, bronzes, tapestries, wood, frescoes and so on—came under Pope Pius XI in 1923. Despite the fact that most of their technicians have been there for 15, 20, 30 years, they are lively young to middle-aged people who nip out for a smoke now and then and enjoy visitors. The oldest member of the elite crew of about 40 is a Hungarian nun named Sister Sebastia, who has worked in the tapestry-restoration laboratory for 48 years and has nary a dodder in her compact, energetic body. From 8 A.M. to 2 P.M. Sister Sebastia and her crew—two Spanish nuns, one Italian one, and three civilian Roman women—sit in a huge, well-lighted room and meticulously match the right shade from 6,000 different spools of thread to mend the Vatican's tapestries.

Stretched out on a big frame in front of them was the huge *Miraculous Draught of Fishes*, a tapestry made in Brussels to the design of Raphael. It, too, will tour the United States, so all of its tiny rents and worn spots, all of its possible areas of weakness, had to be caught and mended. Now and again the nuns looked up from their work to admire Raphael's design—the graceful birds, the beautiful perspective of a scene of village life in the background. On this day they had wound the tapestry so that only St. Peter was visible. "Where is Jesus?" a visitor asked. "Under the table," said one nun with a twinkle, and they all giggled.

Undoing the mistakes of the past

One problem the nuns do not have to face, unlike their colleagues in the other laboratories, is the complex question of "reversibility." Reversibility, which has become one of the knee-jerk words of modern restoration, means simply that anything which is done to repair or preserve a work must be capable of being undone or reversed if it proves to have been ill-advised or if a better method comes along later.

"Much of what we do is undoing what was done before," said master restorer Biagio Cascone in the

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laboratory for paintings. He was working on a big Guercino painting of the Magdalene which needed little more than slow, meticulous cleaning.

On the other hand, when Caravaggio's *Deposition* went for cleaning, radiography done by a special laboratory for scientific research revealed that parts of the undercoating were coming loose from a canvas backing which had been put on in the 19th century. The *Deposition* could not travel in that condition. Technicians put a special paper "bandage" over the entire painting, to which the color adhered. Then they removed the old backing, put on a new one with a substance they call "pasta" because it has a flour base, and used a plain old household iron, at moderate temperature, to glue the whole thing back together again. The paper bandage, having served its purpose, was washed off with hot water.

Etruscan bronzes were cleaned up for show with distilled water, which does not remove the patina as older cleaning methods did. Pots were restored mainly by removing old varnishes based on glue derived from animal hooves, cleaning and applying new sealants which do not discolor. Two little terra-cotta *bozzetti*, or preliminary studies, done for major works by Bernini and Algardi required little more than a special cleaning to remove a tempera made of black earth, animal starch and purple dye which somebody had put on them years ago to make the terra-cotta look like bronze. Melozzo da Forli's lovely "musical angels" (p.131) which had embellished a fresco in the apse of the Church of the Holy Apostles in Rome and were cut out and saved when the church was demolished in the 18th century, were cleaned with application of a compress or chemical-soaked bandage that literally sucked out dirt and impurities and then was peeled away to leave the painted surface clean and hard. In place of the original thick heavy plaster backing, restorers mounted the angels on a thin backing of canvas, cork and an aluminum sheet so they are lighter and firmer and far easier to handle than before.

At the heart of all the work is the separate laboratory for scientific research, founded some years after

Master restorer scans Caravaggio's *Deposition*. It was cleaned with solvents for the exhibition here.

Also en route to America is Guercino's *Magdalene*, shown being meticulously cleaned in Vatican laboratory.

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Bet you know someone who'd love one.

©Eastman Kodak Company, 1982

the individual restoration centers. "Our job is to help the restorers," says its head, Dr. Nazzareno Gabrielli. "We're not here really to experiment, but to analyze, to test products, to study and discuss."

"Their work is indispensable," says Giancarlo Colalucci, head restorer for a work which cannot be included in the U.S. show but which is the biggest and most important restoration job at the Vatican today—cleaning the frescoes in the Sistine Chapel. The work began in 1980 and will not be finished until 1992. "The scientific research laboratory does radiographs, microphotography, tests of solvents and preservatives, to help us find proper treatment," he says. "They do these tests before, during and after restoration so we have a control and a verdict."

The undermanned research laboratory (Gabrielli and one assistant) is awaiting delivery of a complex defraction-metering machine that will make it possible to analyze the chemical components of inorganic colors without actually removing a sample for study. It is also nondestructive to metals, may be efficacious in the study of paintings and frescoes, and holds high hope for study of some kinds of marble.

In the meantime, one of their most useful tools is microphotography, which can make the layers of a fresco or a painting show up like a kind of biopsy of human tissue. First they remove a tiny fragment of paint, embed it in a cube of clear plastic and photograph it. In the color diapositive one can see the plaster or other substance on which it was painted, the undercoating, the paint itself, the sealer or varnish if any, and on top of it all most often a dark layer of dirt and pollution. This gives restorers a good idea of what they are dealing with, and chemical analysis of the tiny chips yields further precious information.

Dr. Gabrielli denies any magic, or even any true innovation in the Vatican's restoration work. "All we have tried to do which is different from before is open ourselves to contact with other laboratories, other experts," he says. "Not so long ago restorers were like magicians or soothsayers, guarding their secrets and their techniques. Now we work *al luce di giorno* [in daylight]. No laboratory can afford all the instruments, and every single instrument itself has a limitation. So we must pool our tools and our knowledge, call in outside experts, go to conferences.

"In the very old days," he continues, "restorers were painters or sculptors or antiquarians who copied things. They overpainted, they rebuilt, they created. Now we have more respect for the original work."

Then the modern man in the modern laboratory looked with unconcealed joy at the tacked-up photographs of the marble statues, Renaissance paintings, Etruscan bronzes whose ailments and fractures absorb his working days, and elevated his shoulders eloquently: "The old restorers used what they had, and what they knew. They are criticized too much. At least they preserved the works until our own time, so that we have them still."

So they did, and it is a choice selection of these preserved works that, escorted by an elite team of Vatican packers and restorers, will make the unprecedented trip by air to and across the United States.

Mends were made in 16th-century tapestry chasuble of Pope Clement VIII, worn in the Sistine Chapel.

Restoration incomplete, Melozzo da Forli fresco is not in exhibition, but shows marked effects of cleaning.

Louis-Léopold Boilly painting shows Versailles court where oath leading to French Revolution was taken.

By P. S. Wood

It shows its age, but 'real' tennis is alive and well

Centuries later, cloth balls still thud on the hard walls of the few remaining courts where the game is played as it originated

W. J. C. Surtees checks skylight during renovation of West Court at New York's Racquet and Tennis Club.

One winter day, two professional athletes drove to a small Catholic women's college in Lakewood, New Jersey. They took with them a couple of heavy, misshapen rackets, which they called "bats," and eight not-quite-round, cloth-covered balls. They were looking for a game of tennis.

Not the slam-bang money game played at Flushing Meadow by the likes of McEnroe and Lendl. The grail that Barry Toates, a slight, bearded expatriate Englishman and his former apprentice, Graham Hyland of Hobart, Tasmania, sought was a far more elegant and complex vessel: the original, the "real" game of tennis.

Beside it, modern tennis—lawn tennis as it is properly called—lacks elegance and historical weight. It is not by chance that two recent movies set in 19th-century England, *The French Lieutenant's Woman* and *The Seven Per-Cent Solution*, spiced their flavor with scenes shot inside a tennis court—"real" tennis, that is. For most of its 700-year history the game was known simply as tennis, or, in France, *jeu de paume* (the palm game), despite the fact that the racket replaced the palm of the hand as the motive surface around 1500. Now, to distinguish it from its far more popular offspring, it goes under the name of real or "royal" tennis in Great Britain and "court" tennis here in America.

Photographs by Brownie Harris

Seen from "service side" looking toward "hazard side," players contest a match.

Among themselves, however, aficionados—those sufficiently enlightened to understand the arcane scoring system, no more than 2,000 in the whole world—steadfastly adhere to the single word, tennis.

By whatever name, the game in all its elements—the lopsided bat, a vocabulary belonging to medieval France, and above all its setting—bespeaks the richness of a fine antique. The cavernous court (above) is an asymmetrical, Alice-in-Wonderland chamber divided by a net that is two feet lower in the middle than at the ends. The walls are buttressed and fenestrated with juttings and openings bearing names that attest to the game's origins in a French cloister. The tambour, the grille and the dedans each play a special part in the complicated rules, or, as they are more properly known, the "laws of tennis."

A "running, jumping and hitting version of chess" is a good analogy. As with chess, the overall concept, the balance between attack and defense, and the inexhaustible possibilities for variety within the rules as they evolved centuries ago have left court tennis relatively immune to time.

Toates and Hyland would feel perfectly at home across the sagging net from Henry VIII of England, and vice versa—although Henry knew nothing of the railroad or boomerang serves. Putting fierce and deceptive spins on the ball, modern players have developed the serve to a fine art, while in Henry's day the serve was so little considered that points were often begun simply by having a servant shy a ball up on the penthouse (just one of the many architectural peculiarities of the court)—hence the term "to serve," prevalent in virtually all racket sports today.

But the English monarch would have caught on quickly, for as the Venetian ambassador noted in 1519, he was "extremely fond of tennis." So that he might play when he chose, Henry had five courts built during his lifetime. The most famous is that at Hampton Court Palace, which four centuries later still resounds to the peculiar blackjack thud of the solid cloth balls (p. 139) striking the stone-hard walls and to the marker's chant.

No wonder, then, that Toates (p. 136) and Hyland, two of the world's best players, would drive into New Jersey to try out a court that had not been played since 1916. To the best of their knowledge, there were at the time just eight playable courts in the United States. Two were at the Racquet and Tennis Club in New York, where Hyland was then the resident professional and where just weeks earlier he had defeated Toates, his former teacher and the title holder, in the finals of the U.S. Open. The rest were scattered from Boston to Aiken, South Carolina. To discover a ninth court smacked of raising the *Titanic*.

A squash player who has tried his hand at court tennis, P. S. Wood wrote about the Nature Conservancy in the December 1978 SMITHSONIAN.

Clarence Pell demonstrates stroke on the court in Newport, Rhode Island.

Ed Hughes waits for a ball to drop from penthouse on court at Georgian Court.

A multiple exposure captures Hughes' body motion in playing a backhand.

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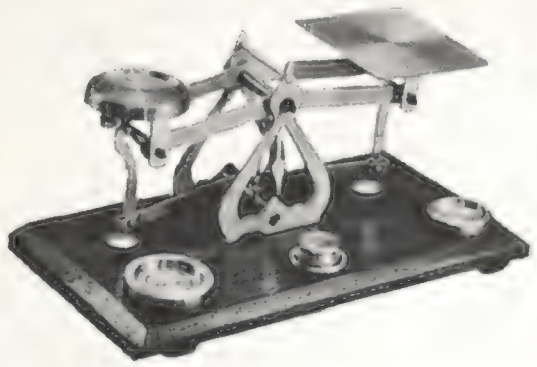

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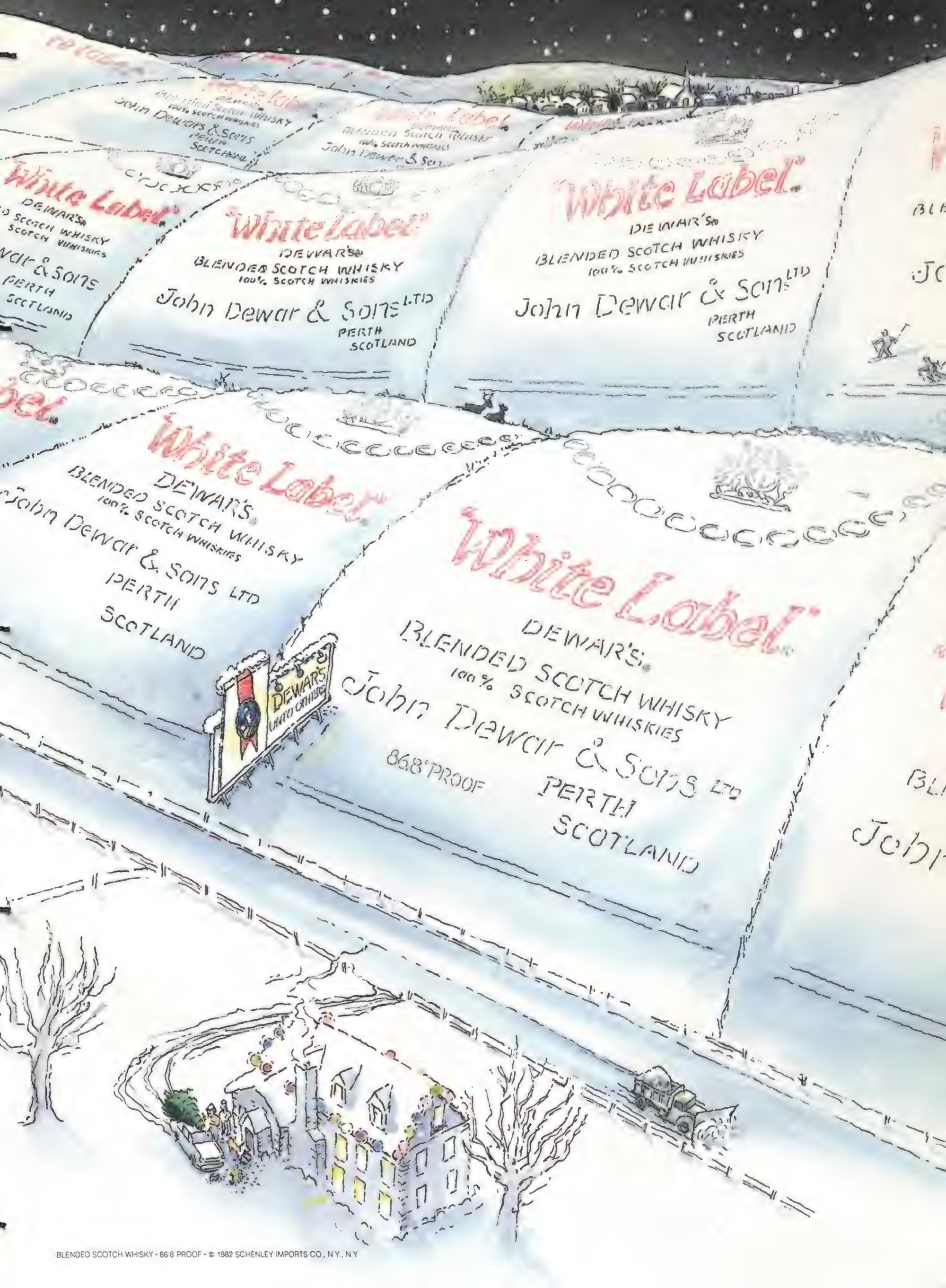
Barry Toates instructs Kathryn Wooley, who reached this year's women's finals.

The women's college that owns the court occupies the buildings and the magnificent grounds of an 1890s estate built by George J. Gould, the eldest son of robber baron Jay Gould. With all the modesty of his age and station, this heir to the Gould millions named his hideaway "Georgian Court." The college retained the name when it acquired the property.

George Gould was a sportsman on a grand scale. Among the yachts he sailed was the Herreshoff-designed 128-foot sloop *Vigilant*, one of the largest America's Cup defenders ever built. But polo was his real passion, and the stables at Georgian Court were vast. Besides the stables there was the so-called Casino. Lavish even for so lavish an age, the Casino sat well apart from the mansion and was considerably larger. Under one roof, much of it glass, Gould had directed his architect to include a three-quarter-size polo field (the earth floor is now boarded over). There was also a bowling alley, a marble swimming pool, a squash-tennis court, a racquets court, and finally—the prize that Toates and Hyland were questing after—a court-tennis court. There they were, standing in the middle of a room 110 feet long, 38 feet wide and soaring to a skylight. Everything appeared to be in order. The elements were all there: the 30-foot-high side wall, the little square window behind it called the grille, the long opening at the opposite end of the court called the dedans, and the gallery openings below the penthouse.

The students of Georgian Court had used the space for lawn-tennis practice and calisthenics, and now the impromptu tennis archaeologists improvised a net and hung it in a limp curve across the center of the court, roughly approximating the droop of the true tennis net (p. 142). They began to rally. With each chopping stroke, Toates and Hyland explored the idiosyncracies of the court. The bounce off the penthouse, the rebounds off the back walls and the way the different surfaces take the heavy cut are characteristics that differentiate one court from another. And no two are exactly the same.

"For us it was a voyage of discovery," Toates would recall. "We were



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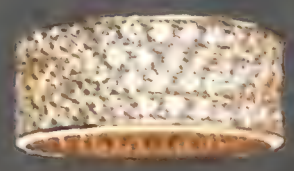

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very excited. The court was in near-perfect shape."

George Gould's son Jay, grandson and namesake of the family fortune's founder, began to play court tennis when he was just 12. The year was 1901, and that other racket game, that garden-party diversion invented by Major Wingfield to be played out of doors, was still only 28 years old. George Gould employed Frank Forester, a teacher of court games who had learned them at Prince's Club in Knightsbridge, England, to tutor his sons Jay and Kingdon.

Jay, the younger, proved a passionate student. Little more than a year after he had taken up tennis, his father brought down from the city for the weekend James Henry Smith, one of the best players at the New York Racquet and Tennis Club.

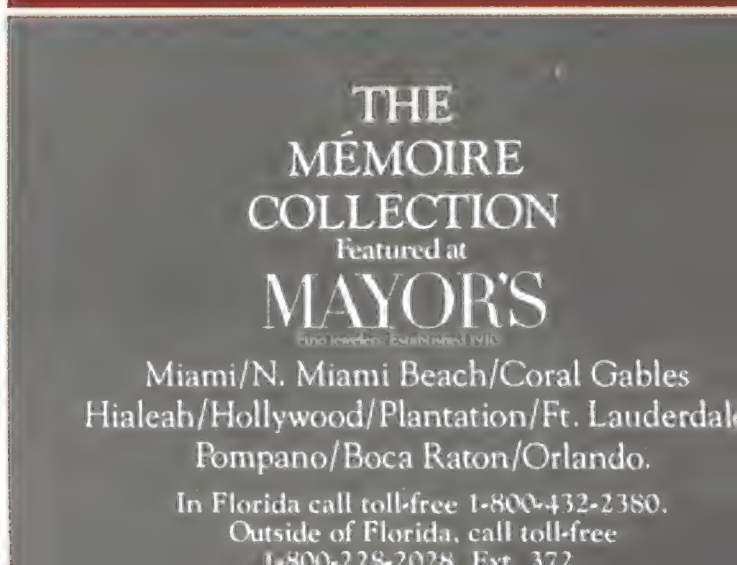
"I think my boy can beat you," George boasted. And Jay did, showing the promise that four years later would lead him, at the age of 18, to the national amateur title. For the next 20 years he never lost a major tournament on this side of the Atlantic. In 1907 he won the British championship. And did it again in 1908, when he also carried home an Olympic gold medal. Finally, in 1914, to cap his career, Gould soundly trounced the reigning world open champion, the British professional, George F. Covey.

Gould thus became the first amateur in the history of the game to hold the world championship. And as firsts go, that may be accounted quite an accomplishment, given the breadth of years that history spans. Among ball games, only polo claims a more ancient pedigree. Lord Aberdare, an Englishman who himself has won the British amateur championship four times, recounts the highlights of real tennis down through the centuries in his exhaustive study, *The Willis Faber Book of Tennis and Rackets.*

He gets off the mark by rehearsing anthropological speculations about the origins of ball games in general. Among them he lists Man's "innate urge to throw, hit or catch small round

Illustration from Diderot's encyclopedia shows construction of ball and racket.

To make ball, string is tied around a cloth core (center), then covered with melton.



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Edmund J. Barre, here in 1849, reigned as world champion from 1829 to 1862.

Surtees demonstrates "sidewall serve"; modern players have added several twists.

objects such as stones or apples."

We learn from Lord Aberdare about the ball games of the Egyptians, Greeks and Romans and how pagan rites were transformed into Christian rituals in which monks slapped balls around the courtyards of cloisters.

And how did tennis get its name? It grew out of the custom of the server (or the servant) to call out in French, "*tenez*" (take heed) before putting the ball into play. As for that curious expression "love," meaning no score: it is the anglicized version of the French word for egg, *l'oeuf*, representing zero or a goose egg.

Modern tennis scoring, incidentally, was lifted directly from the ancient game, which may have been based on the stations of the clock—15, 30, 40 (short for 45)—as three of the four points needed to score a game. The concept of deuce, the necessity of winning a game by two points, also belongs to court tennis and to the French word *deux*, meaning two. What lawn-tennis inventor Wingfield pointedly omitted from the game he first called "Sphairistike" was the concept of the "chase"—"the divine chase," as it was aptly called by one Victorian enthusiast. Yet this is the very essence of tennis—and like most essences difficult to translate into words. Suffice it to say of the chase that merely driving the ball past an opponent, as in lawn tennis, does not necessarily win a point. In effect, the quality of the shot is gauged by an attendant called a "marker" who notes how close to the server's rear wall it bounces a second time—the closer the better. Thus, "chase three" means that the second bounce came three yards out from the back wall. And "chase better than a half a yard" indicates a bounce closer than a half a yard, the perfect stroke, as no finer distinction can be made.

The point is then held in suspension until the players change sides. Now the player against whom the "chase three" was scored gets a chance to "win it," as the marker will call out, by hitting a better shot, or "lose it," should his second bounce be farther from the wall than three yards. It is a little like pitching pennies. Too hard is no good, and too soft is no better. It takes great control on the part of the hitter, and keen judgment by the receiver, who may or may not

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THE GAME of TENNIS
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GAME AS LOOKERS ON
HOOP OUT OF COURT
If a ball strikes it the Stroke is Lost
OUT OF COURT
SIDE WALL
SIDE WALL
HAZARD SIDE
SERVICE SIDE
THE DEDANS
Nineteenth-century diagram shows the elements of a "real" tennis court.

opt to return the shot, depending on where the second bounce will fall.

Beyond his revelations about the vocabulary of tennis and its scoring system, Lord Aberdare has combed the annals of history and literature for every possible reference to it. He cites, of course, the French Dauphin's gift to Henry V of a cask of tennis balls, suggesting that the English king would be better employed playing games than making war. And Henry's reply, as penned by Shakespeare:

> When we have match'd our rackets to these balls,/ We will in France, by God's grace, play a set/ Shall strike his father's crown into the hazard./ Tell him he hath made a match with such a wrangler/ That all the courts of France will be disturb'd/ With chases.

Aberdare quotes *The Art of the Tennis-Racket-Maker and of Tennis* by the 18th-century French academician François de Garsault. From it we learn the recipe for coloring the inside of the court: "Take half a hogshead of ox blood, fourteen bushels of lamp-black, the gall of ten oxen to dissolve the lamp-black, and a bucket of urine to give sheen to the composition, mix it all cold."

By 1800 the game was in decline on the Continent. Napoleon played occasionally at Fontainebleau. So did Wellington on his side of the Channel. At least 18 courts were built in Great Britain during the 19th century and, after the remarkable 32-year reign of France's Edmond Barre that ended in 1862, Englishmen and Americans were world champions.

From that point on, the history of tennis became a recitation of the great English professionals down to the present, with a single Frenchman thrown in for old time's sake. Chris Ronaldson, the young resident professional at Hampton Court (who was to have defended his world title last month in England), could establish himself as an all-time great. As of now, the last of the legendary giants was the Basque player Pierre Etchebaster (right). He held court, as it were, at the Racquet Club in New York from 1937 to 1974 and held the world title for 27 years until retiring undefeated in 1955 at the age of 61. He understood the chase, you see.

Below the professional level, the game continues to be contested by a small elite. One such is W. J. C. Surtees (p. 140)—Willie to his friends and admirers. Shortly before noon one Thursday, Surtees left his office in the Seagram Building in midtown Manhattan and crossed Park Avenue. The 33-year-old advertising executive, darkly handsome in a blue pinstripe from Savile Row, appeared as much a symbol of his time and station as Mies van der Rohe's starkly modern bronze-and-glass office tower that rose 42 stories behind him.

Surtees' destination was another landmark from another time—a broad McKim, Mead & White masonry edifice. An immense red-and-blue banner emblazoned with a Racquet Club monogram and crossed rackets flew from a flagstaff jutting from the building's pseudo-Florentine facade.

On his way to the elevator he passed bronze statues of athletes. One wore long trousers and gripped a stout racket with an oddly canted head. The identifying plaque had been polished over the decades to near illegibility. Not so the chalk notation on a blackboard beside the elevator. It announced that W. J. C. Surtees and R. W. Tuckerman would meet that noon to contest the club championship in tennis.

If Surtees won this championship it would amount to a triple crown. Within the large, ancient and eccentric family of racket sports, only three are contested seriously at the Racquet Club. The games are racquets (spelled with a "qu" by Americans, a "k" by the British), squash and court tennis. The newly popular and highly commercial racquetball would be about as welcome as a pinball machine in the billiard room. The first two, simple in concept if not in execution, are

Sculpture of Pierre Etchebaster, a legend in this century, stands in New York club.

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In an 18th-century French engraving, players engage in "murderous" exchange.

played like handball in a four-walled room, but with rackets. So far as the rules go, they are similar. The essential difference is the ball. A squash ball is rubber, pneumatic and relatively soft. The ball in racquets is hard like a baseball, but smaller. From a strictly physical standpoint, racquets is considered the purest of the racket sports—among gems, the diamond: incredibly hard, but lacking perhaps the natural color and subtleties of court tennis. Like court tennis, racquets survives today only in a very few private clubs and at certain schools and universities around the world—a decided irony, since the game originated sometime around the middle of the 18th century in London's debtors' prisons.

Racquets is a game for young athletes, and just about the only youths who have a chance to learn it when it should be learned are those who attend one of the 12 exclusive British "public schools" which have racquets courts. Surtees, a product of Rugby School and Oxford, is such a one. At the time of the match he had held the racquets championship of the world for the better part of a decade. Here on Park Avenue his superiority in that game is so absolute that he graciously declines to compete for the club championship. Nevertheless, no one would consider it presumptuous of him to count it his. As for the more popular game of squash, he had held that club title for the past three seasons. Now, having won convincingly in the earlier rounds of the Racquet Club tennis tournament, he would be pleased to add that title.

Tuckerman was already on the court practicing when Surtees arrived carrying an armful of bats. Standing on the hazard side, Tuckerman would toss one ball after another up onto the penthouse, letting it roll down as it might after a serve, then blasting it just inches over the low center of the net, so that its second bounce fell in the corner close to the rear wall—"chase better than one."

Tuckerman, a Harvard graduate and real-estate executive, won the spin and elected to serve. He sent one spinning down the length of the penthouse. It fell into the court so close to the corner and with such a saucy bounce that Surtees could manage only a weak return. Tuckerman took it easily off the floor, making a perfect riposte that skimmed the tam-

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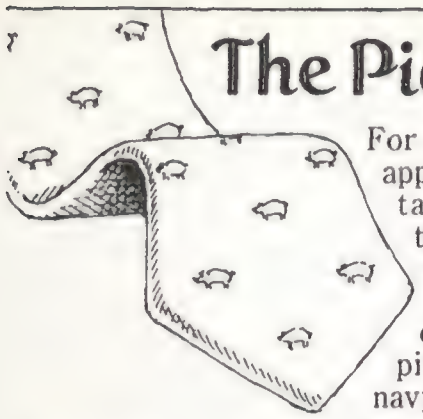

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bour and disappeared into the grille.

Fifteen-love, Tuckerman. After that the points fell fairly evenly as the style of each player began to emerge and the match took form. Tuckerman, who at 44 was giving more than a decade to his younger opponent, had a good feel for the court and for the strategy of the game. But he lacked Surtees' strokes. Tuckerman was a scrambler. He got the ball back one way or another. Surtees, on the other hand, though less of a strategist, had classic form. "No!" he would cry when he muffed a shot. "Move your feet; that's a horrid stroke."

As the match continued, there were fewer and fewer such "horrid strokes." Surtees took the first set by six games to five, and then the second by the same margin. The only breather court-tennis players are permitted is when they change courts to attack or defend a chase. By the third set Tuckerman was tiring. But he held on, dropping the third set and the match by a respectable six games to four. Surtees had his triple crown.

In the bar after the match, Surtees pointed out a small oil (p. 133) on temporary loan "from an anonymous friend of the Racquet and Tennis Club." It had been painted by the master Louis-Léopold Boilly (1761-1845), who is experiencing something of a vogue. The canvas depicts the interior of the tennis court at Versailles. Save the dress of the players, who were in knee breeches and full-sleeved shirts, the scene differed in no serious particular from that in the west court at the Racquet Club just half an hour earlier.

"A charming little work," commented Surtees. "And it has an interesting history. Until about a year ago it hung in some obscure corner of the Manchester Tennis and Racquet Club in England. Silly asses didn't know what they had. Used to get squiffed and fling mince pies at it, I'm told. When they cleaned it up and sold it, it fetched a goodly sum from some American collector. They put a new roof on the club. Saved their bacon."

The thought was irresistible that someday the real game of tennis, once a sport of kings, might likewise be rediscovered, hanging largely forgotten in a handful of clubs. As games go, it is more than a quaint keepsake, it is an authentic masterpiece.

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Book reviews

Robert Osborn
Osborn on Osborn
Ticknor & Fields, $29.95 before January 1, then $35

I first became aware of Robert Osborn while I was learning to fly some 30-odd years ago. An airplane buff himself, Osborn had done a series of wartime cartoon posters for Naval aviation, featuring a dumb cadet named Dilbert (SMITHSONIAN, December 1976).

Along with Kilroy, Dilbert has passed into our culture. People who never saw the cartoons commonly refer to everyday stupidities as "Dilberts." The office walls of my little dirt airport in New York State were plastered with Dilberts, although we couldn't have been farther

Dumb Dilbert introduced wartime cadets to the rudiments of flying.

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Even our London Bridge, the one you see here, was being carved out of rock by the sea while the other London was still a cluster of huts on the Thames.

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Naturally some shopping, gallery hopping and an evening at the fabulous Sydney Opera House are de rigueur, and you'll have to sample at least a few of Sydney's fabulous (and often surprisingly inexpensive) restaurants.

But the countryside beckons and how better to see the real Australia than on a working sheep station? You can visit for a day or become a member of the family and stay as long as you like.

Wherever you go in Australia, you'll find the greeting warm and genuine and the open hands you'll see are for shaking, not for tipping.

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But perhaps you'd rather explore for something more valuable. How about gold? Australia had a gold rush like California's and parts of the historical gold country still exist. You can pan for gold in streams that are far from "played out," and everything you find is yours to keep.

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"On the whole . . . it's been pure joy," writes Osborn about his work. Here is *There I was dancing in the Fall.*

This character is beset with an advanced case of Premonition.

From boyhood impersonations to adult drawings, Chaplin was always a favorite.

Osborn's portrait of Buster Keaton shows the tragic mask of the comedian.

from the Navy. The posters were effective, too. There's no way of knowing how many student pilots' necks Osborn has saved, but they must be legion.

My main exposure to Osborn since has been in the pages of such publications as the old *Life* and the *New Republic*. I have always admired not only his line but what might be called his paucity of line, especially in this age of comic-valentine political cartooning, with most everybody trying to draw like Ronald Searle.

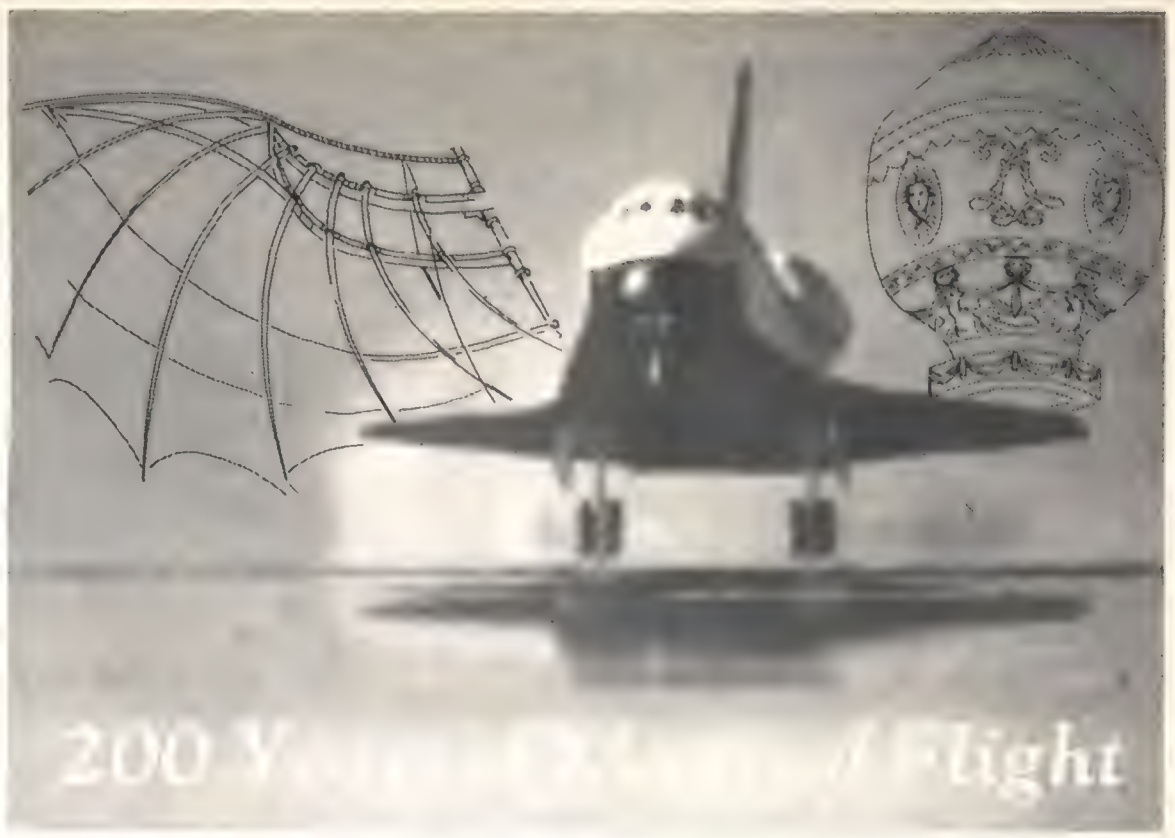
Osborn's drawings are so spare as to be one step removed from blankness—but what a step! Harold Ross, the editor, who brought American cartooning out of the caves, was once trapped in a chic group that was arguing about What is Art? After listening sourly for a while, Ross terminated the discussion by saying that Art is Revision. Just about everything printed in the *New Yorker*, graphic or textual, under Ross' heavy editorial hand had the deceptive look of having been done in a few effortless minutes.

What Osborn does is simply to put white space to work. He uses plenty of it. It looks so easy. It drives admen and art students crazy. To admen space is money. To students it is a trick technique. You know: to paint like Picasso you put both eyes on one side of the nose, or to draw like Osborn you make two slashes across a blank sheet. . . .

Incidentally, the text of *Osborn on Osborn* solves an old puzzle for me. Why wasn't he in the *New Yorker*? It seems he once sold Ross a cartoon. The editor paid him five dollars for the idea and got somebody else to draw it. Oh, well, not even Ross was infallible.

The first pages of Osborn's memoir are self-conscious. Like a smart-aleck schoolboy he leads off with a three-word paragraph: "I was born." Somewhat turned off, I plowed on because I admire him and wanted to know what made him tick.

It was worth it. The text turns out to be a sentimental, rich tale of a middle-class, early 20th-century upbringing. His father was a lumberman with more love for his family than for the environment. Osborn unblushingly adored his mother and adores his wife. He grew up in the Middle West and matured in the East, developing high standards against which he set and limned the political and social events of his time.



Since man first appeared on the face of the Earth and saw birds flying high he has held a dream to emulate them and soar through the air. As early as the era of Aristotle (about 400 B.C.), man thinking that flying was similar to swimming, tried to imitate the birds. Through the centuries, men tried various flapping machines, all with the same dangerous results. One such great engineer was **Leonardo da Vinci**, who is probably better known for his painting accomplishments than for his technical achievements. His theories about what subsequently became soaring were truly astounding. Had he pursued these instead of his painting, he probably would have advanced aviation faster than it actually evolved.

On **November 21, 1783, the Montgolfier Brothers, Joseph and Jacques Etienne**, are credited with the first hot-air balloon ascent. Just a few weeks later, on **December 1, 1783, J.A.C. Charles** and his hydrogen-gas filled balloon ascended to about 2,000 feet above Paris. This was the first time that man left the surface of Planet Earth, ascended into the atmosphere, and then landed safely and softly.

Manned flight as we know it started here, and others followed. In fact, the balloons predate the **Wright Brothers** by well over a century. Think of it, in less than 200 years, man left the surface of Planet Earth in a balloon, then took a rocket to land on the moon, quite an accomplishment indeed. From the Wright Brothers up to today Americans have been at the forefront in Aerospace Technological development. After the Wright Brothers came Lindbergh over the Atlantic in 1927, Byrd and his South Pole flight in 1929, Wiley Post's solo around-the-world flight in 1933, Communications Satellites, Neil Armstrong on the moon in 1969, and the recent **Space Shuttle** spectaculars.

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Does this sound dull? It isn't. The author had fun along the way, and his share of adventures. The farther the text gets from the opening paragraph the better it gets. *Osborn on Osborn* is loaded not only with photographs and his familiar line drawings, but with color reproductions of his paintings, which clearly put the guy into the genius class.
Bill Mauldin
Cartoonist

Six Armies in Normandy
John Keegan
Viking, $17.95

Many of the American paratroopers who jumped into Normandy in the early hours of June 6, 1944, later recalled thinking of favorite sisters as their airplanes droned toward the coast of France. Infantrymen clawing their way inland house by house bore bruises and contusions all over their bodies—a wound pattern characteristic of the street-fighting soldier. Bombs dropped on the Norman countryside slaughtered dairy cattle by the thousands.

John Keegan's eye for such telling details remains as sharp in *Six Armies in Normandy* as it was in his already classic *The Face of Battle* (SMITHSONIAN, November 1976), his account of how one combatant might have experienced war on three battlefields widely separated in time. In his hands, the familiar reveals features hitherto unrecognized or insufficiently noticed.

What could be more familiar than D-Day—the invasion of Normandy—subject of best-selling histories, a blockbuster film, numerous television documentaries? Of this century's soldiers, who could be more famous than Eisenhower, the Supreme Commander who, despite terrible uncertainties of weather, gave the order to go ahead with the landing? Yet Keegan's new look at Normandy shows how much a gifted historian can teach us about men and events we thought we already knew well. (Of Eisenhower he suggests that his greatness as a soldier "has indeed yet to be portrayed fully"—a judgment that is surely correct.)

Convinced that an army reflects the society and culture whence it springs, Keegan had the ingenious idea of telling the story of the battle for Normandy through the actions of the six national armies engaged in it: the American airborne troops who dropped into France; the Canadians who came ashore at Juno Beach; the Scottish infantrymen who broke out of the beachhead, and the English cavalry who charged with their tanks into the deadly Norman landscape; the German panzers trying to hold the ground; the Polish dragoons who closed the "Falaise pocket"; and finally, the Free French forces who liberated Paris.

The Normandy invasion, of course, marked an end as well as a beginning, putting to a finish the struggle among the leadership of the three great Allies over when and where a Second Front would be opened in Europe. In the end, the strategy of a little-known American general prevailed. In September 1941, Albert C. Wedemeyer, a lieutenant colonel in the War Department, drew up a plan that would largely determine "how and where the American army would fight the Second World War." The plan foreshadowed the invasion of 1944.

It is a far cry from the high-ceilinged old wedding cake of a War Department, where Wedemeyer's strategy took shape, to the stone villages and hedgerows of Normandy, where its tactics were worked out. Keegan keeps Karl von Clausewitz's (the foremost modern theorist on land warfare) distinction between real war and war on paper firmly before us. Wedemeyer's invasion plan was war on paper, neat as a ruled line; the Normandy invasion was real war—episodes of deadly violence punctuated by horrible accidents and terrible mistakes.

War in Normandy was characterized, too, by such nightmarish scenes as the flight of the mad women from the mental hospital of the bomb-devastated city of Caen: "Blundering at times into the ragged and indistinct no man's land which separated Germans from Americans, and shocking both into unofficial armistice by their macabre intrusion from a third world of the mind, these aliens were at last got to safety."

Keegan's way of telling his tale recalls that of the late Bruce Catton, chronicler of the American Civil War. With Catton, he shares a gift for vivid imagery, as when he describes amphibious tanks "launched into the deep, plopping off the ramp into the waves like toads from the lip of an ornamental pond."

Keegan is more than a storyteller. He

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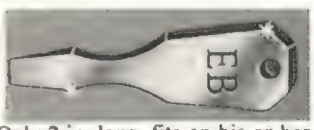

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is as preoccupied with the significance of the Normandy invasion in the history of warfare as he is with recounting what happened in the summer of 1944. Normandy was the greatest example of that most dangerous of military operations, the transfer of men and equipment from the sea to the land. Churchill, for one, was in a good position to know how disastrously amphibious operations could go wrong. In the end, however, the Allies proved to be strongest where they had feared themselves to be weakest—in the movement of their forces over the treacherous seas of the Channel. Vastly outnumbering the German defenders, controlling the seas before the beaches and the air above them, once they had got ashore they could not be dislodged.

Keegan concludes that we probably will not see the likes of Normandy again. Satellites, for instance, have made the gathering in secret of such a vast armada extremely improbable. The greatest invasion in the history of Europe may also be the last.

John Talbott
Professor of History
University of California, Santa Barbara

Wall-to-Wall America: A Cultural History of Post-Office Murals in the Great Depression
Karal Ann Marling
University of Minnesota Press, $35; $14.95 paperback

It is well known that a vast, inefficient and meddlesome bureaucracy obstructed the public art programs of the Thirties in this country. Narrowly defined "American lore" guidelines led inevitably to a representational and inherently conservative art. There the story has rested, a history of bureaucratic taste and plodding politics, until Karal Ann Marling's *Wall-to-Wall America*.

In this important new study of the post-office mural commissions handled by the Treasury Department's Section of Fine Arts from 1934 until 1943, the author provides a meticulously researched description of the mural movement in Depression America. She deals with a seemingly inevitable confrontation between the three P's: the patron (the government), the painters (the artists—traditionally social aliens in American culture) and the public. The public consisted of the inhabitants of a primarily small-town America who reacted with outrage, puzzlement, or admiration to the decorating job being done on their community post offices.

The author presents an intricate portrait of American taste in the 1930s. By drawing on numerous aspects of popular culture at the time—Disney cartoons, commercial murals of an earlier vintage, exotic movie-palace architecture, and fashion, for instance—as well as her own firm grounding in art history, she shows what the murals meant to people.

She ranges widely into villages and cities all over the 48 states. She tells of Aiken, South Carolina, where the courthouse mural done by Northern artist Stefan Hirsch sparked anxieties over racism and states' rights. There was Paris, Arkansas, sensitive about stereotypical depictions of rural backwardness and poverty. And there, too, was Corning, Iowa, an agricultural community wanting to see itself reflected in the neighborly conviviality of a *Band Concert*.

While this study initially emphasizes migration themes, it turns out that the public wanted images that bespoke stability, security, staying home. Historical scenes were the most popular, along with vignettes of unchanging local customs and flourishing indigenous industries. This apotheosis of the local scene fueled resentment against artists working long-distance, and a reverence for tradition tended to equate modernism with communism, one of the few political issues addressed in the text.

Mural America was about ritual and continuity; its wall paintings became visual bridges arched between a comforting past and an idealized future. If religion and statecraft supported mural art in centuries past, the 1930s versions were plaster and paint dreams. Those dreams seem somewhat tattered now. What is left of them in public lobbies appear like so many quaint bits of Americana, old-fashioned reminders of an era of hard times and Utopian aspirations. *Wall-to-Wall America* treats them with the even-handed respect of esthetic considerations, but it also raises important questions about the relationship between government, audience and art.

Celia Betsky
Associate editor
Portfolio magazine

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Additional reading

Transglobe Expedition (p. 44)

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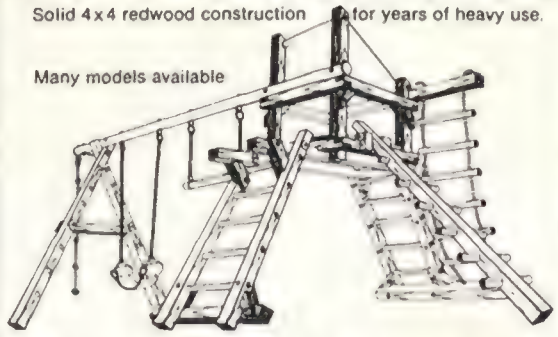

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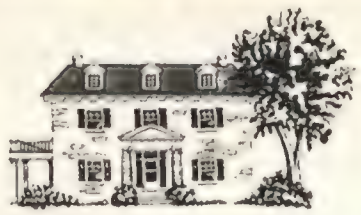
(signed) Carey O. Randall
General Manager



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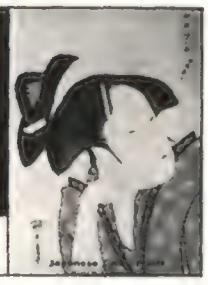

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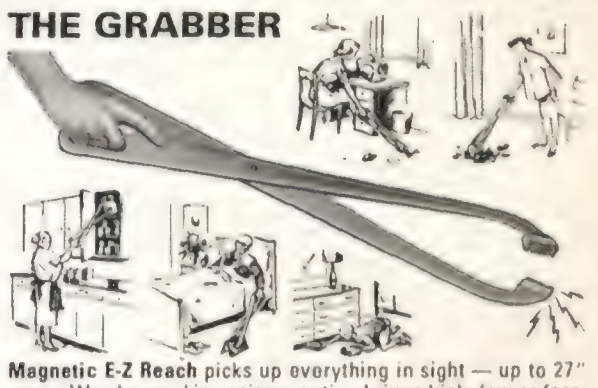

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Smithsonian highlights

The National Museum of American History is hosting a gigantic holiday celebration during the last week of the month. Against a backdrop of Christmas trees decorated by the Smithsonian's Office of Horticulture, the music and festive foods of George Washington's time will be on center stage. There will also be movies (*Little Women* and *A Christmas Carol*), crafts demonstrations (hour-glass blowing, clock making, Jewish paper cutting) and even a one-man band.

In keeping with this spirit, "The Seasonal Trade: Holiday Gift and Greeting Cards," a new offering from SITES, begins its tour this month at the Colorado Historical Society in Denver. These 100 elaborate examples from the 1880s and 1890s reflect the Victorian card makers' fierce competition for the trade. Some are mounted on satin or velvet, or are embellished with ribbons, tassels and bows. Others fold out or are cut into unusual shapes. Originally conceived as miniature "artistic pictures," they are all suitable for framing.

Special December exhibits and events

National Museum of American History
Holiday Celebration (December 26-31) Traditional Christmas, Hanukkah and New Year's activities.

National Museum of Natural History
Black-tailed Deer: A Life Cycle (December 23-February 20, 1983) Sixty color photographs taken from camouflaged blind by Kenneth Herrington capture deer through the changing seasons.
Did Darwin Get It Wrong? (December 3; noon) Film explores challenges to Darwin's doctrine on the origin of species.

National Air and Space Museum
IMAX Film Festival (begins December 17) Special weekend evening shows will include *Hail Columbia!* and *Silent Sky*. Call 357-1686 for details.
Flying Wings (December 2; 7:30 P.M.) Lecture on controversial 1940s aircraft.
Stars of Christmas (December 4; 9 A.M.) Monthly sky lecture.
Holiday Star Talk (December 27-29; noon) Three half-hour programs.

Hirshhorn Museum & Sculpture Garden
Hirshhorn Holiday (December 4, 10 A.M.-2 P.M.) Four hours of continuous music for children age six and over, with adult.
David Smith: Painter, Sculptor, Draftsman (through January 2, 1983).

National Portrait Gallery
Portraits in Motion December programs include "John Brown's Body" and "Oh, Mr. Faulkner, Do You Write?" For information call 357-2920.

Cooper-Hewitt Museum (New York)
American Picture Palaces (through February 27, 1983).

Smithsonian events

For price information and tickets to Resident Associate events, call 357-3030:
In Search of Human Origins (December 4) All-day seminar with four scholars.
Archaeology at Ain Ghazal, Jordan (December 15) Slide talk on new finds by excavation director Gary Rollefson.
Africa and the Global Crisis (December 13) Lecture by Elliott Skinner.
Claude and Light (December 1) Slide lecture on Claude Lorrain's study of light by art historian Michael Kitson.
An American Architect Abroad (December 9) Architect Hugh Newell Jacobsen discusses his recent foreign projects.

Smithsonian Institution Traveling Exhibition Service

SITES circulates exhibitions to hundreds of cities outside Washington. To sponsor a show in your community, write: SITES, Smithsonian, Washington, D.C. 20560. Here are some December exhibits:
Denver (December 4-January 2, 1983) *The Seasonal Trade: Holiday Gift Cards*, Colorado Historical Society.
Montgomery, Alabama (December 4-January 9, 1983) *Irish Silver*, Montgomery Museum of Fine Arts.
Baltimore (December 18-January 16, 1983) *Loose the Mighty Power: Impressions of the Steam Engine in America*, Maryland Science Center.
Neenah, Wisconsin (December 4-January 2, 1983) *English Naive Paintings*, John Nelson Bergstrom Art Center.
Rochester, New York (December 18-January 30, 1983) *Treasures of the Quicksilver Galleons*, Rochester Museum and Science Center.
Memphis (December 18-January 9, 1983) *Black American Landmarks*, Memphis/Shelby County Public Library.

In SITES show: L. Prang & Company advertised with this poster in 1881.

Radio Smithsonian

Performance on the lute and discussion of this instrument's history by lutanist Howard Bass, astronomy of ancient Mexico and Central America, and the rebuilding of the Soviet air force in 1945 are among the December listings for Radio Smithsonian. To find out which stations in your area carry these programs, write: Smithsonian Office of Telecommunications, MNH Room C222B, Washington, D.C. 20560.

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A dicey stunt that turned real

An aerial stunt in the Air and Space Museum's new feature film, *Flyers*, is leaving viewers aghast and almost disbelieving. But they don't know the half of it: what happened when the sequence was filmed is even more hair-raising than the movie.

In the film, a fledgling stunt man, Tim, plunges when the plane on which he is wing-walking unexpectedly rolls. Tim's instructor, Kyle, is flying alongside in another plane, which he puts into a deep dive, racing to Tim's rescue. Both heading straight down now at 120 mph, they edge closer until—*contact!*—Tim wraps his arms around the wing strut.

Now here's what *really* happened. The stunt was filmed in three parts—the wing-walk, the fall and the catch. The first two went off without a hitch, using parachutes and numerous run-throughs. But the third was a one-time-only shot. Stunt man Kevin Donnelly, who did the jump, knew how tricky it was: "Since nobody had ever made a hook-up with an air plane from the front like that, I didn't know what to expect," he says. "With the propeller turning I had to look at the plane constantly: I was depending on Art to watch the altitude."

Art Scholl, flying the "catch" plane, was watching the altitude, all right—and the ground came up all too fast. "We had planned that Kevin would hook up at 6,500 feet, and we made it at 6,000. But a 70-knot wind had blown us both over a mesa 4,800 feet high, so now we were at only 1,200 feet going straight down at terminal velocity."

Kevin held tight: within four seconds after hook-up he'd lost the option of jumping off and parachuting down. Scholl pulled the lever to jettison an open drag chute from the plane's tail—it had been opened thousands of feet above to slow the plane's dive. It failed. So did both backup jettison systems, preventing him from nosing the plane up.

Working frantically now, Scholl edged the plane through a gap in the mesa, the drag chute clearing rock by ten feet. Finally, at 500 feet, the chute disengaged and, with Kevin still married to the wing, Scholl followed the winding river out of the canyon and headed for the airport.
Constance Bond

1) The aerial rescue scene shown in *Flyers* opens with an aspiring young stunt man, Tim, wing-walking over the Grand Canyon.

4) Tim plummets toward earth; but Kyle has dived after him in hot pursuit. (The shots of Tim falling were actually done separately.)

MacGillivray/Freeman Films & Dennis Earl Moore Productions; a Conoco Inc. presentation.

2) Flying alongside in a 450 Stearman, Tim's mentor, Kyle, films him as he prepares to do a headstand atop the plane.

3) Overconfident, Tim unfastens his safety belt, then loses his balance when the plane rolls.

5) Kyle catches up; in the actual filming, both are now going down at almost 120 mph, and trouble develops . . .

6) . . . the hook-up is perfect, but both plane and stunt man have been blown over a high mesa; the ground is only 1,200 feet below.

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Yellowstone in Snow February 18-27: Ski across magical landscapes to observe coyotes, otter, eagles and elk.

Okefenokee Swamp March 26-April 2: Canoe through this beautiful primeval refuge with its moss-draped cypress trees and array of springtime flowers.

New Orleans April 10-17: Learn about the history, architecture and cuisine of New Orleans and southern Louisiana.

Big Bend April 13-22: Hike the spectacular trails in this southwest Texas wilderness.

Washington, D.C.: Power and Style April 26-May 1: Spend a day in Congress; visit charming neighborhoods, historic sites and museums with local guides.

Kentucky Bluegrass May 12-19: Visit historic homes and horse farms in Louisville, Lexington and Shakertown to discover the area's rich heritage.

Florida Keys May 13-22: Travel from Miami to Key West on this active outdoor tour of snorkeling and canoeing. Concludes with overnight boat trip to the Dry Tortugas.

Wine Cellars of Sonoma and Napa Valleys May 22-29: Intensive study of California wines includes discussions with wine masters and special comparative tastings.

Treasure-Houses of Early America June 5-12: Architecture and decorative arts along the Delaware, Brandywine and Chester Rivers. Includes two days at renowned Winterthur.

San Juan River June 8-16: Spectacular scenery and an exciting white-water trip through the canyons of southeastern Utah.

Coming in May . . . Archaeology of the Southwest.

Washington "Anytime" Weekend: An economical and convenient way to visit your choice of Smithsonian museums for two or more nights at Loew's L'Enfant Plaza or Hyatt Regency. Package includes hotel, two meals, Tourmobile ticket, and exclusive tour of Smithsonian castle. Application and payment must be received at least ten days prior to arrival.

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Baroque Winter January 2-16: Opera, lavishly decorated churches, museums, castles in Vienna, Salzburg and Munich, with a special Viennese ball.

Mayan Mexico: The Yucatán Peninsula January 20-February 1 or February 10-22: Tour extraordinary Mayan ruins in the company of an archaeologist.

India Wildlife Safari February 5- March 2: Travel by elephant and jeep to observe rare species of birds and animals. Includes Kathmandu and Tiger Tops, Bombay, Delhi and the Taj Mahal.

Caribbean Study Voyage February 11-20: The luxurious 317-foot, four-masted *Sea Cloud* sails through the Lesser Antilles for a study of tall ships and the area's natural and cultural history.

Red Sea Passage February 23-March 7: Sailing from Suez on the *Argonaut*, visit Karnak, Luxor, Valley of the Kings, Abu Simbel in Egypt and Petra in Jordan. Tour the mosques and bazaars of Cairo, the Sphinx and pyramids of Giza.

Indonesia March 26-April 15: Cruise beyond the ordinary to the islands of the Java Sea, including Bali and Komodo. Study natural history and traditional crafts; observe local customs and rituals. Visit Singapore and Hong Kong.

Canals and Old Masters April 14-28: Art museums, historic tours and spring flowers highlight a four-day stay in Amsterdam. From Arnhem, sail on rivers of Holland and Belgium, ending with visits to Bruges, Ghent, Antwerp and Brussels.

Rouen and the Norman Countryside April 16-May 1 or October 1-16: The ancient city of Rouen provides a superb setting for a program of walking tours, museum visits and special excursions nearby, including Norman churches, elegant beach resorts, and Monet's Giverny.

Baja Mexico April 29-May 8: Adventure cruise in the Gulf of Mexico. Observe whales, porpoises and dolphins plus the nesting birds of the Midriff Islands.

Russia May 6-21: Leningrad, Moscow and Riga: See the Hermitage, the Kremlin and other fabulous museums, palaces and landmarks. Visit schools, factories, clinics and enjoy the best of Russian theater.

Ecuador and the Galápagos Islands May 8-20: After visiting Quito and the Andean countryside, board the *Santa Cruz* for a study voyage through Darwin's famed islands.

Seminar in Florence May 13-29: Study the Florentine Renaissance while living in a 15th-century villa. Attend lectures, field trips and language classes.

Odyssey of Flight May 22-June 6: An exciting opportunity to visit the Paris Air Show, the Musée de l'Air, Britain's Shuttleworth Collection and more with experts from the National Air and Space Museum.

Alpine Countryside May 28-June 12 or September 10-25: Study folk art and architecture, flora, fauna and geology in a charming Austrian mountain village.

Wild Highlands of Scotland June 2-19: Based in a castle, observe shy wildlife and the brooding landscapes of loch and moor. Visit the Isle of Skye and meet local residents to learn about the region.

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Selected Studies Seminars

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Genealogical Research March 13-18: Taught by Milton Rubincam, Marilyn Duncan and other leading authorities, participants learn how to conduct research in major genealogical repositories such as the National Archives, Library of Congress and DAR Library.

Contemporary Book Publishing March 20-25: The director and staff of the Smithsonian Institution Press along with guest experts give an inside look at new developments in editing, design, production and marketing of popular, trade and scholarly books. Includes lectures by a leading author, bookseller, agent, reviewer and publishing executive, as well as special tours of the vast U.S. Government Printing Office and a commercial printing firm to see the latest techniques used.

French Impressionist Painting March 27-April 1: Lectures and tours with Bill Kloss of the masterpieces by Monet, Degas, Renoir and others in the fine collections of Washington's many museums. (Repeated due to demand.)

The Golden Age of Flight April 10-15: The National Air and Space Museum staff along with well-known authors focus on this fascinating era—its sensational record flights and the countless companies that boomed or busted in the period between the two world wars. Includes special tours at the museum of the famous surviving aircraft of that era.

Chinese Ceramics April 24-29: Connoisseurship of the timeless beauty and outstanding craftsmanship of renowned masterpieces. Highlights exquisite export wares, enameled porcelains, recent discoveries, dating controversies, detection of fakes and the market today.

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By Richard L. Williams

If you really like garlic then Gilroy, CA 95020, is the town for you

Gilroy was here. Well, around here somewhere, on the California map. Ah, here it is, about 100 miles south of San Francisco and a bit north of Hollister, a city with faults, earthquake faults that won't stay still. Not far away from Gilroy, its white buildings standing out atop a range of hills, is Lick astronomical observatory.

Gilroy calls itself the Garlic Capital of the World. (Some call Hollister the world's earthquake capital, but let that pass.) You can smell the head-clearing aroma of garlic for miles before you get to Gilroy, just as you smell chocolate for miles before Hershey, Pennsylvania.

Every midsummer they hold a garlic festival in Gilroy. On my one and only visit to the place, I missed the garlic festival (I lunched in a garlic-free Mexican restaurant), but I read in the newspaper about the cook-off and recipe contest, in which more than 900 recipes from all over were submitted. Most judges were hardened pros: food editors from Chicago, Denver, the Los Angeles area. Garlic was really onstage.

Some of the recipes must have made even Mrs. Mary Mozzone, the contest chairman, who runs a fashion and beauty establishment most of the year, hold her nose. An entrant from Germantown, Tennessee, called her selection "Moosebreath Specials." They were appetizers, mixed with cream cheese, onion, eggs and flour along with garlic. Yvonne O'Reilly, a San Francisco actress, submitted her idea for a bedtime snack, consisting of slivers of garlic pressed into hunks of ripe banana. Her father, she explained, was a Shakespearean actor who got the concoction from John Barrymore. (We've all heard many things about Barrymore, but garlic breath? Somehow it doesn't sound romantic, or at all in keeping with the image of the Great Lover.) Another entrant proposed a cocktail containing V-8 juice, vodka and four crushed garlic cloves.

The 900 were narrowed down to ten, and the finalists gathered at Gavilan Community College (which must have been a most fragrant place at the time) to do their stuff. And the winner: Rosina Wilson of Albany, California. She triumphed with her "artichokes à la Rosina," chokes boiled with whole heads of garlic (a head can have 20 cloves).

As for the garlic farmers thereabouts, some of them like to nibble their garlic straight. They take seriously the festival booklet, which proclaims that "although the garlic bulb is thought to be of Central Asian origin, it enriches the cuisine and legends of the world: it spiced the revels of Babylonian kings; anointed Homeric warriors; inspired romance in the times of Moses, Caesar and Boccaccio; and warded off the fear of the Black Death in medieval Europe." Of course it also is good for warding off vampires—or *anybody* if you take it straight—and is said to be an excellent means of helping to cure the common cold. An old English proverb gets right to the point: "Garlic makes a man wink, drink and stink."

Anything that wonderful is bound to attract the notice of crooks, who can smell a good thing, like garlic, from miles away. Sure enough, the snatchers have descended on the fields around Gilroy. They wait until the farmers have done most of their work for them. Once matured, garlic plants are "knifed" to loosen them in the soil, pulled, left in the fields to cure, and finally beheaded or topped, ready for packing and shipping.

The garlic thieves are ready, too. Bill Christopher, whose family's A&D Christopher Ranch is the biggest grower in the neighborhood (10 million pounds a year, on about 1,000 acres), described one modus operandi: "Four or five cars drive up and all the people jump out with sacks and run into the fields." His father, Don, has had to hire guards to watch over his fields and has noted that without the guards, he might not have any crop left to harvest. Especially notable was a case that revolved around a miscreant pickup truck; when his guards halted it, 800 pounds of hot, purloined garlic were aboard. At an average wholesale price of about 75 cents a pound, that's a lot of garlic that the marauders were going to make off with. Breath tests won't stop the hijackers, but perhaps the guards will.

Some of the stolen garlic, it is suspected, winds up on the streets of San Francisco, where it is hawked like marijuana or cocaine.

The great Gilroy Garlic Festival will go on year after year. It put the town on the map, and Gilroy intends to stay there. After all, if you've got a good thing going, why turn up your nose at it?

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